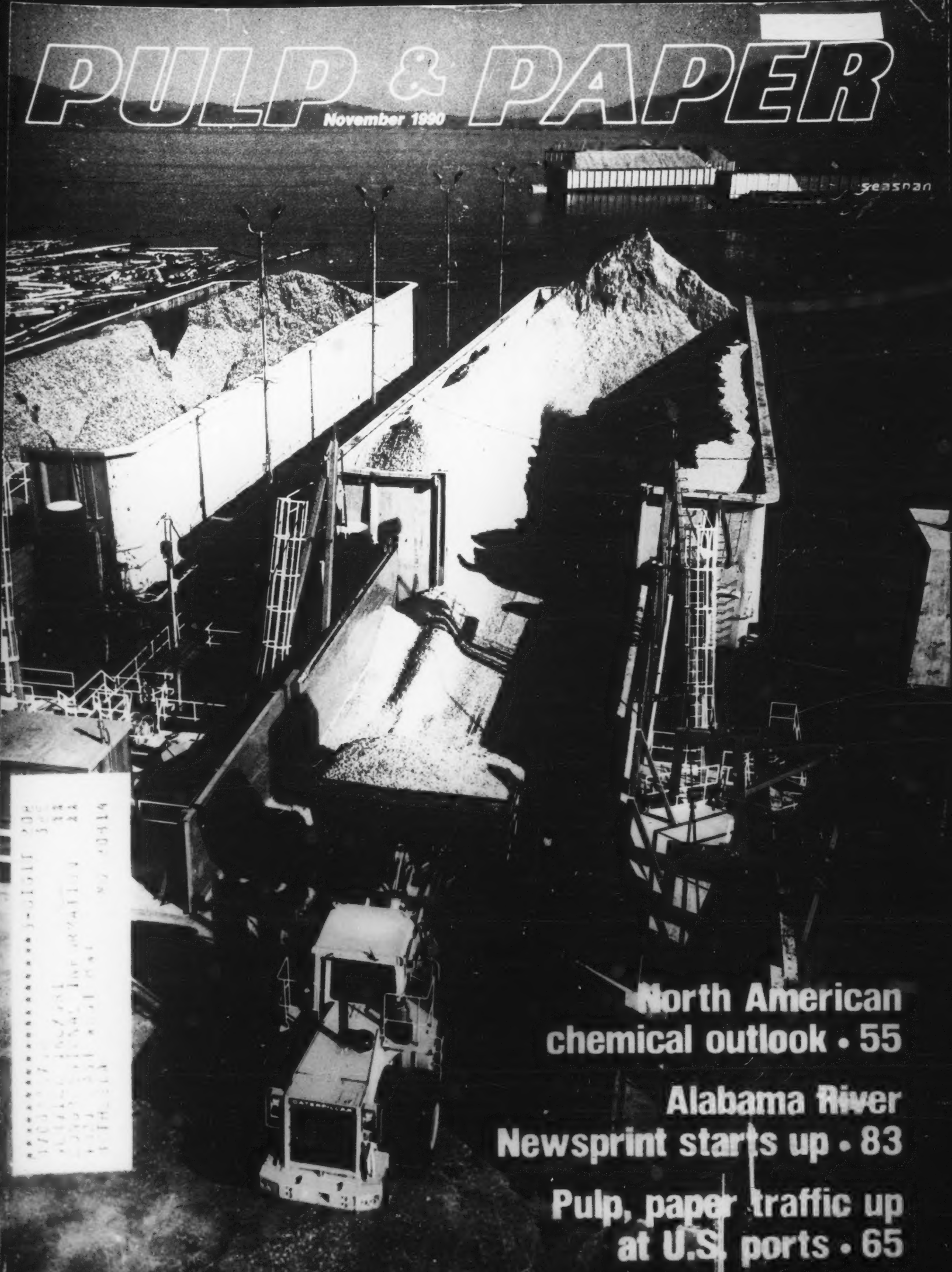
PULP & PAPER

November 1990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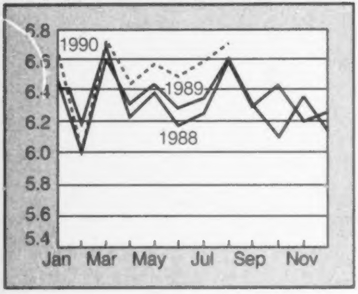
ABP

BPA

MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.7 million tons in August, up 1.4% from a year earlier, according to the American Paper Institute. The seasonally adjusted annual rate of production climbed to 78.0 million tpy through August, up 1.8% from the same month last year. Paper production rose to a seasonally adjusted rate of 39.2 million tpy, up 3.0% from last year, while paperboard stood at 39.0 million tpy, up 0.5%.

Among major grades, newsprint continued to post large year-over-year gains thanks to recent startups of three new machines. Printing and writing paper shipments were up 2.9%, lifted by coated groundwood paper, up 4.3%, and uncoated free-sheet, up 3.3%. Containerboard was buoyed by production for export, up 14.8% through August, but overall production was up just 1.4% due to flat output for the domestic market. Boxboard output was down 1.5% through August despite a 15.5% increase in production for the export market.

Canadian newsprint shipments totaled 750,000 metric tons in August, down 7.5% from last year, while mills operated at 90% of capacity. Depressed woodpulp shipments were off 15.8% to 624,000 tons, as operating rates plummeted to 81%. ■

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Aug.	577	13.1	6,552	9.3
Uncoated groundwood (s)	Aug.	152	-0.7	1,750	1.2
Coated paper (s)	Aug.	661	1.4	7,379	3.7
Uncoated free-sheet (s)	Aug.	975	2.4	11,498	3.3
Other printing/writing	Aug.	135	5.5	1,579	2.7
Total packaging and other paper (s)	Aug.	402	-5.4	4,691	-3.8
Tissue	Aug.	501	3.5	5,771	2.8
Total paper	**Aug.**	**3,402**	**3.0**	**39,220**	**3.0**
Unbleached kraft paperboard	Aug.	1,722	1.2	20,082	1.9
Semichemical medium	Aug.	478	-2.0	5,706	-0.2
Bleached paperboard	Aug.	362	-8.6	4,450	-2.4
Recycled paperboard	Aug.	744	2.3	8,766	-0.8
Total paperboard	**Aug.**	**3,306**	**-0.2**	**39,003**	**0.5**
Total U.S. paper and paperboard output	**Aug.**	**6,708**	**1.4**	**78,223**	**1.8**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	July	5,490	1.7	63,052	1.2
Market pulp production	July	783	2.9	8,784	-1.0
Wastepaper consumption at paper/board mills	July	1,752	11.2	21,050	6.1
Pulpwood consumption (cords)	July	8,487	-0.7	99,230	0.8
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft^2)	Aug.	28.055	0.8	213.229[6]	1.3
Containerboard inventories at U.S. box plants and mills	Aug. 1	2,653	-1.3		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	July	1,064	16.2	13,237	4.8
Imports of Canadian newsprint	July	667	13.6	8,450[6]	4.0
U.S. paper exports (including products)	July	544	11.9	8,785	8.8
Exports of unbleached kraft linerboard	July	226	37.8	2,688	20.9
Exports of woodpulp	July	471	-12.8	5,863	-8.0
Norscan pulp inventories[4]	Aug. 31	1,682	63.6		
Norscan pulp operating rates[4]	Aug.	83%	92%	89%	88%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Aug.	750	-7.5	6,239[6]	-0.8
Operating rates	Aug.	90%	98%	94%	97%
Inventories held by U.S. consumers	Aug. 31	1,383	3.8		
Other paper/board shipments	Aug.	674	9.4	4,975	8.4
Woodpulp shipments (export only)	Aug.	624	-15.8	5,026	-10.0
Operating rates	Aug.	81%	97%	86%	95%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Kraft paper: Weakness in commodity grades, but producers are still able to raise prices

Grade structure: Commodity bag and sack paper is the largest category of kraft packaging paper, accounting for about 62% of total shipments in 1989, followed by multiwall, 29%; converting, 6%; and wrapping, 3%. Basis weights for bag and sack paper range from 30 lb to 80 lb/3,000 ft², with the lower basis weights used for small grocery and merchandise bags, while 70-lb paper is commonly used for larger-size grocery carryout sacks.

Multiwall shipping sack paper is 50 lb or 60 lb. Kraft paper's natural color is brown, but a semi- or fully bleached sulfate process will produce kraft paper in lighter shades of brown, cream, or white.

Production/capacity: Unbleached kraft paper (UKP) shipments declined by 4.2% to 2.681 million tons in 1989, after declining only 1.4% in 1988. Grocery bag and sack shipments dropped only 0.9%, but multiwall paper shipments went down by 8.1%, and other bag and sack shipments declined by 14.6%. Producers maintained reasonable operating rates because most of the swing machines in the industry produced incrementally more linerboard, thereby minimizing excess capacity.

Total bleached kraft paper (BKP) shipments increased only 0.5% last year to 467,000 tons, after increasing 14% in 1988. Demand remained strong, but producers were capacity-constrained. Currently no major capacity additions are planned for bleached kraft paper in the next two years. Incremental gains from productivity improvements and some swing capacity from other bleached paper grades can be expected.

For the first seven months of 1990, UKP shipments were down 9.4% from the year before, with the losses concentrated in the wrapping and bag and sack grades. Multiwall paper shipments were down 1.9%, while other converting paper gained 12%. Imports of unbleached kraft paper have been growing in the last few years and now account for about 9% of new supply. Shipments of other packaging and industrial paper—bleached kraft, specialty packaging, and special industrial paper—were up 3.3% for the first seven months of 1990.

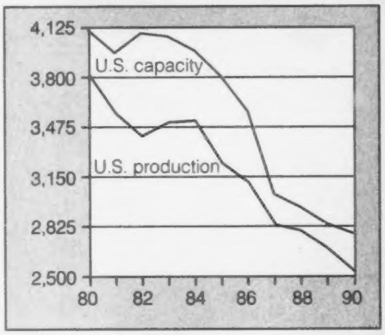
No new kraft paper capacity will be added until Longview Fibre Co. starts production on its new 300-tpd paper machine at its Longview, Wash. mill this month. The new machine will produce both bleached and unbleached lightweight packaging grades. Consolidated Paper Co. is also expected to start up a new coated specialty paper machine this month. The 160-tpd machine will produce lightweight coated specialty paper used in food and consumer product packaging and labeling.

Outlook: After a decade-long decline, grocery bag and sack paper shipments may have finally bottomed out. Demand for kraft paper grocery bags is expected to benefit from increased environmental concerns over plastic bags. Plastic bags now account for 40% to 50% of the entire grocery bag market, and more than 90% of U.S. grocery chains are using plastic grocery bags in their stores. Bleached paper bags have lost minimal market share to plastic bags. Demand for multiwall paper will continue to be depressed due to weak markets for shipping sacks for commodity chemical, industrial, and agricultural products.

Pricing: Producers increased BKP and UKP prices approximately $40/ton in the first quarter of 1989. Producers now plan to raise prices by about $30/ton in the fourth quarter of 1990. If successful, the new prices for heavyweight (70-lb) grocery sack paper will be about $525/ton; multiwall (50-lb) grades will be about $580/ton; lightweight (30-lb) unbleached grades will be $660 to $690/ton; and lightweight bleached grades will be $830 to $840/ton. Heavyweight grocery bag paper prices were $40 to $50/ton lower in 1990 due to competitive pressures from both East Coast and Canadian producers.

Year-end price history for 70-lb grocery sack paper: 1980, $280; 1981, $300; 1982, $240; 1983, $280; 1984, $330; 1985, $300; 1986, $365; 1987, $400; 1988, $455/$465; 1989, $495/$505. Multiwall sack paper (50-lb): 1980, $375; 1981, $405; 1982, $360; 1983, $390; 1984, $410; 1985, $360; 1986, $400; 1987, $460; 1988, $510/$520; 1989, $550/$560. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

	1988	1989	1990e
Shipments	2,800	2,681	2,555
Capacity	2,957	2,843	2,745
Utilization rate	94.7%	94.3%	93.1%
Imports	162	240	250
Exports	110	125	115
Apparent U.S. consumption	2,852	2,796	2,690
lb/capita	23.3	22.3	21.5
GNP ratio[1]	0.73	0.69	0.64

e = estimate.

[1] 1,000 tons/$billion real GNP

Source: American Paper Institute, *Pulp & Paper* estimates.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity[1]	Market share (%)
1. Stone Container	635	23.1
2. Georgia-Pacific	355	12.9
3. Union Camp	350	12.7
4. Longview Fibre	285	10.4
5. Gaylord Container	270	9.8
6. International Paper	260	9.5
7. Champion International	195	7.1
8. Chesapeake	115	4.2
9. Port Townsend	100	3.6
10. Willamette	70	2.6

Market share of top five companies:
69.0%
Market share of top ten companies:
96.0%
Total U.S. capacity (1990):
2.745 million short tons

[1] Unbleached kraft paper capacity only, does not include bleached kraft paper.

Last timber compromise unconstitutional

In October 1989, timber industry supporters and environmentalists agreed to a compromise on national forests in the Pacific Northwest that led to federal legislation freeing up some disputed forestland sales for harvest while protecting other forestland as northern spotted owl habitat. The law, known as the Northwest Timber Compromise, dismissed some pending lawsuits holding up timber harvests in old-growth forests and challenging the U.S. Forest Service's owl protection plan. A federal appeals court in California has now ruled this provision unconstitutional because it impinges on court authority.

However, the law was due to expire one year after the bill's passage, and much of the timber involved has already been sold. So the timber industry does not expect that the court's ruling will have a major impact. However, environmentalists think they may still be able to challenge those sales.

Adding to the confusion, the Bush administration came out with a plan to cover harvesting on Forest Service lands for the fiscal year beginning Oct. 1. The plan involves a request to Congress to permit sales of 3.3 billion bd ft of timber in Washington, Oregon, and northern California. That compares with a total of 7.7 billion bd ft authorized for the previous two years combined. ■

SPECIALTY PAPERBOARD

Recycled mill to resume production

Brownville Specialty Paper Products Inc., a new company, will begin production of 80 tpd of recycled paperboard by the end of this year. The former Boise Cascade Corp. mill in Brownville, N.Y., was purchased by two private investors, Richard Howland and Donald Alexander. Gene Rood, former manager of the Boise mill, is president and principal of the new company. Rood said that the new owners may upgrade the mill and increase capacity but "the goal for now is to just get the mill up and running." The mill will be fully operational in 1992. ■

ENVIRONMENT

EPA lists mills with high dioxin levels

The Environmental Protection Agency has named 19 pulp and paper mills that release enough dioxin in their effluent to create a significant cancer risk for people who eat fish downstream of the mills. EPA also rated the risk from the rest of the 104 pulp and paper mills that make use of chlorine bleaching. The data, which give an estimate of the risk of cancer incidence during the lifetime of an exposed individual, are part of a study that was released in summary form earlier this year.

Deputy EPA administrator Henry Habicht said that his agency "suggests that states consider imposing fish consumption advisories or start site-specific monitoring programs at all streams that have a projected risk as high as one in 10,000 or greater." But he also commented that "these risk levels will come down as EPA and states impose more stringent permit limits and mills reduce dioxin discharges."

EPA and various states are issuing National Pollutant Discharge Elimination System (NPDES) permits to limit dioxin discharges from pulp and paper mills that use chlorine bleaching. Most permits for 66 of the worst-case mills will be issued by February 1991, EPA said. By June 1993, the permits will call for the mills to meet water quality-based effluent requirements developed by the states. Permits at other facilities will be issued as existing permits expire. Meanwhile, EPA is developing national industrial effluent limit guidelines and standards based on best-available, economically achievable technologies to reduce dioxin contamination and total chlorinated organics from the manufacture of bleached paper products. Those standards will be proposed in 1993 and finalized in 1995 and will entail process changes to prevent the formation of dioxin.

EPA's cancer-risk list has sparked protest from some of the companies named. International Paper Co., for example, which tops the list with a cancer incidence risk of two in 100 for its Georgetown, S.C., mill and has three other facilities in the top 19, said EPA's data is "outdated and misleading." Richard Phillips, IP's staff vice president and process technology director, stated that "EPA's conclusions were based on fish samples gathered several years ago, before improved manufacturing processes dramatically reduced the level of dioxin in paper mill outflow." He added that the Georgetown mill has cut dioxin formation 95% to date. ■

Pulp mills cited for high dioxin levels.

Company/mill site	Cancer risk	Fish consumption advisory in place
International Paper, Georgetown, S.C.	2 in 100	yes
Union Camp, Franklin, Va.	2 in 1,000	no
Buckeye Cellulose, Perry, Fla.	2 in 1,000	no
Weyerhaeuser Co., Plymouth, N.C.	2 in 1,000	yes
Westvaco, Covington, Va.	1 in 1,000	yes
Georgia-Pacific, Palatka, Fla.	6 in 10,000	no
International Paper, Moss Point, Miss.	3 in 10,000	yes
Temple-Eastex, Evadale, Tx.	3 in 10,000	no
Champion, Canton, N.C.	2 in 10,000	yes
Georgia-Pacific, Crossett, Ark.	2 in 10,000	no
International Paper, Texarkana, Tx.	2 in 10,000	no
International Paper, Jay, Me.	1 in 10,000	yes
Boise Cascade, Rumford, Me.	1 in 10,000	yes
St. Joe Paper, Port St. Joe, Fla.	1 in 10,000	no
Boise Cascade, DeRidder, La.	1 in 10,000	no
Simpson Paper, Anderson, Calif.	1 in 10,000	yes
Simpson Paper, Fairhaven, Calif.	1 in 10,000	no
Weyerhaeuser Co., Cosmopolis, Wash.	1 in 10,000	no
Weyerhaeuser Co., Everett, Wash.	1 in 10,000	no

Source: Environmental Protection Agency.

ISSUE FOCUS: SHIPPING

Wastepaper, Market Pulp Exports Lead Paper Products Handling at Seaports

Survey of North American ports shows exports of paper-related products outstrip imports by more than 17 million tons

By KELLY H. FERGUSON, Projects Editor

The global market for North American pulp, paper, and forest products is expanding rapidly, and seaports are handling increased tonnages of shipments. Even though recent legislation may limit timber harvesting in the Pacific Northwest (therefore reducing exports from ports in that region), foreign demand for paper and wood products, especially wastepaper, market pulp, and woodchips, continues to mean major paper industry shipments through ports.

A *Pulp & Paper* survey of North American seaports shows that exports of forest products outstrip imports by almost 17.5 million tons. The survey was completed by 30 ports from all major areas of the U.S. and Canada and included some of the largest "pulp and paper" ports.

Tables 1 and 2 break down exports and imports of major products by the various responding ports. The most tonnage exported was listed in the column called "Other," which included logs, lumber, board, etc. This was due mostly to shipments from the Northwest ports, Grays Harbor and Tacoma, Wash.

Paper and paperboard were the largest imports, with the most tonnage coming into the Port of Philadelphia (Pa.). Other major imports were market pulp and newsprint. The largest importers of market pulp were the northern and midwestern ports (306,915), and much of that tonnage is probably exported by Canada. The largest tonnage of newsprint came into the ports of Long Beach, Calif., and Canaveral, Fla. Again, most of that tonnage probably comes from farther up the continent and is destined for the numerous newspaper publishers in both those states.

Growing for pulp and paper business

The survey asked ports what expansions had been completed or were planned that would benefit shipments of pulp and paper products. Some of the specific expansion plans are listed below.

Port	**Expansion plans**
Albany, N.Y.	Completed new 51,000-ft^2 warehouse with indoor rail platform
New York-New Jersey	Expansion plans currently under review
Philadelphia, Pa.	250,000-ft^2 warehouse being planned
Mobile, Ala.	Two new sheds planned—360,000 ft^2 and 153,000 ft^2
Tampa, Fla.	85,000-ft^2 warehouse under construction
Savannah, Ga.	Port of Brunswick facilities expanded; 200,000-ft^2 warehouse in Savannah
Baton Rouge, Port Allen, La.	60,000 ft^2 of transit shed planned
New Orleans, La.	$200-million capital improvement program
Pascagoula, Miss.	96,000-ft^2 warehouse completed
Morehead City, N.C.	Upgrading existing warehouse space and adding electronic communications (EDI)
Wilmington, N.C.	Upgrading existing facilities and adding EDI
Port Arthur, Texas	200,000-ft^2 transit shed and three new ship berths planned
Tacoma, Wash.	Studying development of Blair Waterway, including future breakbulk and containerized loading facilities
Thunder Bay, Ont.	A "recycle" depot will be developed, and a handling facility for recycled products is planned.

MARKET PULP, WOODCHIP BOOM. Market pulp remains a major export throughout North America, especially in the South, which accounted for 78% of the total market pulp tonnage reported. The Port of Mobile (Ala.) was the largest exporter of market pulp at 900,000 tons. The ports of Savannah, Ga., Baton Rouge, La., Wilmington, N.C., and Charleston, S.C., were also used for major market pulp shipments. In Canada, the Port of Prince Rupert (B.C.) exported the most market pulp (440,920 tons).

Most of the ports that handled market pulp said exports have continued to increase in the last five years, some at remarkable rates. The Port of Philadelphia experienced an increase to 119,113 tons in 1989 from 12,445 tons in 1984. The Port of Tacoma said its exports increased 43% since 1985. The Port of Mobile indicated it had experienced an 18% growth and is projecting exports of 1.5 million tons in 1992. Other ports experiencing increases were Savannah (20%), Pascagoula, Miss. (5% to 10%), Morehead City, N.C., Wilmington (40%), Charleston, Grays Harbor, Halifax, N.S., and Thunder Bay, Ont. (10%).

Woodchip exports have also increased significantly in the past five years, although declines are expected in the next few years for the Northwest. Large stands of southern hardwoods have given southeastern ports, such as Mobile, Savannah, Lake Charles, La., and Morehead City, more export business. Those four ports exported more than 1 million tons of chips in 1989, and if timber harvesting is regulated in the Northwest, the South could become the leading exporter of woodchips and logs.

The Port of Tacoma experienced a 57% increase in woodchip exports since 1986. Morehead City's shipments skyrocketed in 1989 when it exported its first tonnages of woodchips, 350,000 tons. Lake Charles boosted its tonnage to 182,482 tons in 1989 from 51,922 tons in 1988. Mobile increased its exports 12% and projects shipments of 750,000 tons for 1991. Other ports experiencing increases in woodchips were Savannah, Grays

TABLE 1: **Export tonnages of pulp and paper products from North American seaports.**

Exports Port	Newsprint	Paper/ paperboard	Kraft paper	Market pulp	Wastepaper	Woodchips	Other
North and Midwest							
Albany, N.Y.	—	—	—	—	—	—	—
New York-New Jersey	17,342	100,793	—	2,456	1,334,216	—	157,068
Philadelphia, Pa.	—	37,854	—	119,113	—	—	6,294
Green Bay, Wis.	—	—	—	—	—	—	—
South							
Mobile, Ala.	75,000	190,000	260,000	900,000	—	250,000	360,000[1]
Canaveral, Fla.	—	—	—	—	16,534	—	—
Miami, Fla.	59,036	—	—	—	—	—	—
Tampa, Fla.	—	17	35,267	—	9,476	—	—
Savannah, Ga.	—	104,881	383,916	539,668	124,518	331,131	—
Baton Rouge, Port Allen, La.	—	77,569	—	325,159	—	—	—
Lake Charles, La.	11,470	62,302	—	—	—	103,004	—
New Orleans, La.	7,762	219,764	—	165,981	—	—	—
Pascagoula, Miss.	—	15,050	—	156,431	—	—	—
Morehead City, N.C.	10,000	—	17,000	40,000	—	350,000	15,000
Wilmington, N.C.	10,000	13,000	30,000	400,000	—	—	102,000[2] 20,000[3]
Charleston, S.C.	45,653	480,369	20,945	381,623	60,810	—	—
Corpus Christi, Texas	—	—	—	—	—	—	—
Galveston, Texas	—	—	—	—	—	—	—
Port Arthur, Texas	—	1,175	34,503	6,444	—	—	—
Richmond, Va.	—	—	3,142	—	3,662	—	—
West							
Worldport LA, Los Angeles, Calif.	57,388	26,102	38,795	27,701	630,237	64	—
Long Beach, Calif.	57,378	—	—	—	1,017,663	—	—
San Francisco, Calif.	—	—	—	—	85,672	—	—
Grays Harbor, Wash.	—	—	—	—	—	336,803	3,937,023[2] 185,440[1]
Tacoma, Wash.	131,174	54,013	170,856	184,084	122,624	1,393,790	1,903,672[2] 556,661[1]
Canada							
Prince Rupert, B.C.	—	—	—	440,920	—	—	—
Halifax, N.S.	44,092	138,889	—	9,921	—	9,921	110,230
Thunder Bay, Ont.	259,041	—	55,115	33,069	—	22,046	73,854[1]
Quebec	194,787	4,349	3,721	3,807	—	—	—

1. Lumber.
2. Logs.
3. Plywood, chipboard, etc.

Harbor, Halifax, and Thunder Bay.

WASTEPAPER PLAYS BIGGER ROLE. State and federal legislation is forcing the paper industry to use wastepaper at an ever-increasing rate. However, much of the wastepaper collected in the U.S. is still leaving the country, especially that which is collected in major metropolitan areas on both coasts. The Port of New York-New Jersey (1.334 million tons) and the Port of Long Beach (1.017 million tons) lead all other surveyed ports in exporting wastepaper.

Tonnages from these ports have increased quickly. For example, the Port of New York-New Jersey indicated that its exports have increased to the current level from 548,308 tons in 1984, an increase of 779,328 tons. Similarly, the Port of Long Beach experienced an increase of 61% in fiscal year 1988/1989. The Port of Los Angeles also experienced major growth in wastepaper exports from 265,161 tons in 1983 to 693,971 tons in 1988.

Other ports experiencing increases in wastepaper exports were Canaveral (100%—from 0 tons in 1984 to 15,000 tons in 1989), Pascagoula (30% to 40%), Charleston, and Richmond (100%—first shipment in 1989).

The survey also asked ports if they expect wastepaper exports to increase in the next five years. Some of the comments are included below:

- "Moderate increases are expected." (Port of New York-New Jersey)
- "50% to 60% growth." (Port of Philadelphia)
- "Projecting increase to 50,000 tons in 1995 from no tonnage currently." (Port of Green Bay)
- "1,000% increase." (Port of Canaveral)
- "15% increase." (Port of Tampa)
- "5% to 10% increase." (Port of Savannah)
- "10% to 20% increase." (Port of Pascagoula)
- "7.5% increase per year." (Port of Morehead City)
- "We expect slow but steady growth in the future." (Port of Charleston)
- "The demand for wastepaper by foreign countries will continue to grow in the next five years. I would concur with the June 1990 issue of *Intermodal Age*, that worldwide demand for wastepaper exports will increase by 4% per year." (Port of Richmond)
- "5% per year increase." (Port of San Francisco)
- "Recycling plants in Thunder Bay will account for 100% increase from current tonnages." (Port of Thunder Bay). ■

TABLE 2: **Import tonnages of pulp and paper products from North American seaports.**

Imports

Port	**Newsprint**	**Paper/ paperboard**	**Kraft paper**	**Market pulp**	**Wastepaper**	**Woodchips**	**Other**
North and Midwest							
Albany, N.Y.	—	—	—	20,000	—	—	—
New York-New Jersey	61,643	149,556	—	102,774	172	—	444,337
Philadelphia, Pa.	—	535,321	—	133,141	—	—	309,768
Green Bay, Wis.	—	—	—	51,000	—	—	—
South							
Mobile, Ala.	40,000	—	—	210,000	—	—	60,000[1]
Canaveral, Fla.	154,322	—	—	—	—	—	100 million bd ft[1]
Miami, Fla.	—	59,036	—	—	—	—	—
Tampa, Fla.	9,870	—	—	—	—	—	—
Savannah, Ga.	16,484	3,898	—	—	—	—	5,553
Baton Rouge, Port Allen, La.	—	—	—	—	—	—	—
Lake Charles, La.	—	—	—	—	—	—	—
New Orleans, La.	20	9,506	—	8	—	—	—
Pascagoula, Miss.	7,605	—	—	824	—	—	—
Morehead City, N.C.	—	—	—	—	—	—	—
Wilmington, N.C.	—	—	—	—	—	—	20,000[2]
Charleston, S.C.	1,054	208,972	1,607	160	—	—	—
Corpus Christi, Texas	4,845	—	—	—	—	—	—
Galveston, Texas	—	10,090	—	—	—	—	—
Port Arthur, Texas	5,047	—	—	51,514	—	—	—
Richmond, Va.	16,879	—	1,113	—	—	—	—
West							
Worldport LA, Los Angeles, Calif.	19,854	39,742	732	1,501	—	—	—
Long Beach, Calif.	411,914	—	—	—	263,270	—	—
San Francisco, Calif.	—	130,725	—	—	—	—	—
Grays Harbor, Wash.	—	—	—	—	—	—	—
Tacoma, Wash.	73,312	3,999	629	697	2,126	173,198	—
Canada							
Prince Rupert, B.C.	—	—	—	—	—	—	—
Halifax, N.S.	—	—	—	—	—	—	—
Thunder Bay, Ont.	—	—	—	—	—	—	—
Quebec	—	—	—	—	—	—	—

1. Lumber.
2. Plywood.

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Special lubricants, such as those Thilmany Pulp & Paper uses at its Kaukana, Wis., mill (see story on p. 102) are explored in this issue, along with six other features on mill maintenance and training practices at North American and Scandinavian mills. **(Photo courtesy of Dow Corning.)**

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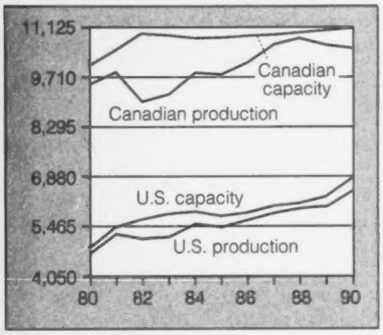
ABP

BPA

MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.5 million tons in September, up 2.1% from a year earlier, according to the American Paper Institute. The seasonally adjusted rate of production stood at 39.4 million tpy for paper and 38.8 million tpy for paperboard. Through the first nine months, the production rate climbed to 78.3 million tpy, up 2.2% from last year. Production has been consistently higher than year-earlier levels since the beginning of the year.

Among major grades, newsprint continued to show impressive gains due to the startup of four new machines since mid-1989, rising 8.8% through the third quarter. Printing and writing shipments posted a 3.5% increase over last year, on the strength of a 4.9% rise in coated paper shipments and a 3.9% increase for uncoated free-sheet.

Canadian newsprint shipments totaled 698,000 metric tons in September, down 15.9% from the same month last year, according to the Canadian Pulp & Paper Assn. Operating rates plunged from 94% last year to just 77% in September 1990. Woodpulp shipments were off 13.1% to 604,000 tons, with operating rates falling to 72%, down from 87% in September 1989. ■

PAPER & PAPERBOARD PRODUCTION[1]

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
Newsprint	Sept.	549	6.2	6,548	8.8
Uncoated groundwood (s)	Sept.	137	-9.9	1,734	-0.2
Coated paper (s)	Sept.	630	3.1	7,493	5.4
Uncoated free-sheet (s)	Sept.	928	4.9	11,507	3.9
Other printing/writing	Sept.	131	5.6	1,579	3.3
Total packaging and other paper (s)	Sept.	393	-3.2	4,694	-3.6
Tissue	Sept.	487	3.0	5,779	2.9
Total paper	**Sept.**	**3,254**	**2.7**	**39,334**	**3.3**
Unbleached kraft paperboard	Sept.	1,707	7.0	20,126	2.5
Semichemical medium	Sept.	455	-1.3	5,679	-0.3
Bleached paperboard	Sept.	376	7.1	4,457	-1.4
Recycled paperboard	Sept.	738	4.2	8,776	-0.3
Total paperboard	**Sept.**	**3,276**	**5.1**	**39,038**	**1.0**
Total U.S. paper and paperboard output	**Sept.**	**6,530**	**3.9**	**78,372**	**2.1**

PULP, WASTEPAPER & FIBER[2]

Total U.S. woodpulp production	Aug.	5,343	0.8	63,185	1.2
Market pulp production	Aug.	808	6.7	8,904	0.1
Wastepaper consumption at paper/board mills	Aug.	1,856	7.5	21,202	6.3
Pulpwood consumption (cords)	Aug.	8,333	-1.9	99,326	0.6

CONVERTED PRODUCTS STATISTICS[3]

Corrugated box shipments (billion ft^3)	Sept.	25.375	-0.3	238.607[6]	1.2
Containerboard inventories at U.S. box plants and mills	Sept. 1	2,620	-1.7		

INTERNATIONAL TRADE[2]

U.S. paper imports (including products)	Aug.	1,089	-10.0	13,218	2.8
Imports of Canadian newsprint	Aug.	671	-12.5	8,400[6]	1.2
U.S. paper exports (including products)	Aug.	603	7.7	6,842	8.7
Exports of unbleached kraft linerboard	Aug.	230	14.4	2,686	20.1
Exports of woodpulp	Aug.	554	3.7	5,961	-6.5
Norscan pulp inventories[4]	Sept. 30	1,494	50.3		
Norscan pulp operating rates[4]	Sept.	78%	84%	92%	87%

CANADIAN STATISTICS[5] *(reported in metric tons)*

Total newsprint shipments	Sept.	698	-15.9	6,937[6]	-2.6
Operating rates	Sept.	77%	94%	92%	96%
Inventories held by U.S. consumers	Sept. 30	1,355	2.3		
Other paper/board shipments	Sept.	574	-1.0	5,550	7.3
Woodpulp shipments (export only)	Sept.	604	-13.1	5,631	-10.3
Operating rates	Sept.	72%	87%	84%	94%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Newsprint: Prices improve despite more capacity, but five new machines next year may be too much

Grade structure: Newsprint is commonly sold in the U.S. in 28-lb to 32-lb. Although the industry has slowly been drawn to the lighter basis weights, this movement has been somewhat stalled by increased emphasis on printing quality and a slow acceptance of flexographic printing. Standard newsprint is still considered to be 30-lb, with brightness in the 55 to 61 range. Of total newsprint consumed in the U.S. in 1989, 74.7% was used by daily newspapers, and the rest was sold to customers including weeklies, commercial printers, shopping news, and government publications, according to the American Newspaper Publishers Assn.

Production/capacity: Newsprint production fared considerably better in the U.S. than in Canada during 1990, as U.S. producers took a greater share of the domestic market and Canadian mills suffered from strikes at several mills in the eastern region. At the same time, demand for newsprint remained sluggish throughout the year because of poor advertising lineage at newspapers. However, publishers rebuilt inventories during the early part of 1990 and kept them high throughout the remainder of the year because of mill strikes.

The combination of newsprint industry strikes and high inventories at publishers' warehouses helped keep the market relatively firm for much of 1990, despite the startup of two new newsprint machines in the U.S., which added 440,000 tpy to capacity. Another five newsprint machines amounting to 820,000 tpy of capacity are starting up during the first three quarters of 1991.

U.S. mill shipments through the first eight months of 1990 were up 10.0% from the previous year, according to the Canadian Pulp & Paper Assn. (CPPA). Canadian shipments during the same period were off 0.8%. At the same time, U.S. consumption rose a slight 1.0%.

Canadian mills supplied 53.5% of U.S. newsprint requirements in the first eight months of 1989, down from the 56.7% supply ratio of a year earlier, according to CPPA. Through August, U.S. overseas shipments fell 20.1% to 279,000 metric tons, while Canadian exports to markets other than the U.S. dropped 5.8% to 1.045 million tons.

U.S. imports from areas other than Canada were off just 1.3% through the first eight months of 1990 compared with a year earlier and represented 2.8% of total imports during that period. At the same time, U.S. domestic sources of supply met 44.9% of demand, an increase of 5.25% from 1989.

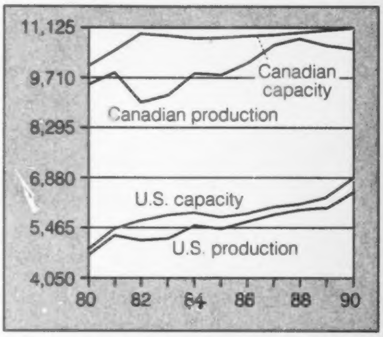
In 1989, Canadian newsprint capacity amounted to 10.020 million metric tons, and U.S., 5.695 million tons. U.S. mills, though, produce most of North America's approximately 2.2 million tons of recycled newsprint, while only one newsprint mill in Canada uses wastepaper as a raw material (though a second Canadian mill was starting up late in 1990).

Outlook: Industry forecasts don't show any significant improvement in U.S. newsprint consumption, which has been relatively flat since 1988. Inventory buildup that occurred in the early months of 1990 may take months to work down in 1991 after strikes are settled in eastern Canada, and this will probably add to an oversupply situation resulting from five new newsprint machines starting up in North America through the third quarter of next year.

Pricing: List prices rose June 1, 1990, as producers took advantage of tight market conditions caused by the threat of strikes in eastern Canada. This threat raised levels by $35/metric ton to $685 in the U.S. East. In the U.S. West, a 5% contract allowance was eliminated, effectively raising the list by $31.50 in that region. Another $35 increase is slated for Jan. 1, 1991. If successful, prices would rise to $720 in the U.S. East and to $665 in the U.S. West. Bowater Inc., however, bucked the trend and decided to lower its discounts by 4% while maintaining the current list.

List price history is as follows (U.S. East, contract, year end, per metric ton): 1974, $259; 1975, $284; 1976, $314; 1977, $331; 1978, $353; 1979, $413; 1980, $441; 1981, $500; 1982, $468; 1983, $500; 1984, $535; 1985, $535; 1986, $500; 1987, $570; 1988, $650; 1989, $650; 1990, $685.

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	**1988**	**1989**	**1990e**
Production[1]	5,982	6,088	6,475
Capacity[1]	6,115	6,280	6,808
Utilization rate	97.8%	96.9%	95.1%
Apparent U.S. consumption	13,498	13,494	13,559
lb/capita	109.8	108.7	108.3
GNP ratio	3.35	3.26	3.21
Canada			
Production[2]	10,847	10,626	10,506
Capacity[2]	10,962	11,045	11,100
Utilization rate	99.0%	96.2%	94.6%

e = *Pulp & Paper* estimate.
1. American Paper Institute.
2. Canadian Pulp & Paper Assn.

TOP NORTH AMERICAN PRODUCERS

	Annual capacity			**Market share**
Company	**U.S.**	**Canada**	**Total**	**(%)**
1. Abitibi-Price	455	1,669	2,124	11.8
2. Canadian Pacific[1]	204	1,815	2,019	11.2
3. Bowater[2]	1,030	238	1,268	7.0
4. Fletcher[3]	—	1,239	1,239	6.9
5. Stone Container[4]	303	899	1,203	6.7
6. Boise Cascade	594	289	883	4.9
7. Champion	864	N	864	4.8
8. Quebec & Ontario	N	842	842	4.7
9. Kruger	N	842	842	4.7
10. Kimberly-Clark[5]	420	355	775	4.3

Market share of top five companies:
43.6%

Market share of top ten companies:
67.0%

Total North American capacity (1989):
17.99 million tons

1. Includes estimated 1990 output from Gold River Newsprint Ltd. Parternship and Ponderay Paper Co. (40% owned) mills. 2. Includes Catawba Newsprint Co. (51.0% owned) and Bowater Mersey Paper Co. Ltd. (51.0% owned). 3. Combined operations of Crown Forest Industries (100% owned) and British Columbia Forest Products Ltd. (69% owned) in 1988. 4. Includes Snowflake, Ariz., mill and former Consolidated-Bathurst Inc. mills. 5. Includes Spruce Falls Power & Paper Co. Ltd. (50.5% owned).

SALES AND EARNINGS

U.S. paper industry profits drop; Canada sinks

Price erosion in containerboard and market pulp and a dismal performance from wood products operations drove third-quarter U.S. paper industry profits down 37.1% from a year ago, according to a *Pulp & Paper Week* survey of 29 companies. Rising energy costs related to the Persian Gulf crisis began to squeeze margins, while some companies also experienced operating difficulties. On the positive side, newsprint and uncoated free-sheet prices strengthened from depressed levels, and tissue remained lucrative despite strong competitive activity. Third-quarter 1990 sales rose 5.4% to $24.1 billion compared with third-quarter 1989.

U.S. paper companies with heavy exposure to wood products were left reeling from plummeting lumber and plywood prices. Since spring, lumber and plywood prices are off roughly 25% as housing starts in the third quarter dropped to their lowest level since 1982. Meanwhile, wood costs in the West remained relatively high due to supply constraints. As a result, some integrated companies reported profit declines of 50% to 70% or more from their wood products operations.

Considering the severe profit declines experienced by other major integrated companies, International Paper Co. took solace in a 15.8% decrease compared with third-quarter 1989. CEO John A. Georges said much of the company's third-quarter performance was due to contributions from its uncoated printing and writing paper business, European operations, and consumer packaging operations. "During 1990, we have benefitted from debottlenecking projects at our mills in Mobile, Ala., Georgetown, S.C., and Ticonderoga, N.Y.," Georges said. "The relative strength of our earnings this year, amidst a difficult operating climate, is directly attributable to the success of our internal improvement and acquisition programs."

Georgia-Pacific Corp. was aided by a reduction in working capital that offset higher interest payments from its acquisition of Great Northern Nekoosa. The operating profits for its pulp and paper business improved 18% in the third quarter compared with 1989. As building products operating income dropped 31%, the company noted the increasing importance of the repair and remodeling market to sustain profitability. Weyerhaeuser Co. was also dragged down by a 56% drop in earnings from building products. Pulp and paper earnings declined 22%, primarily from slumping market pulp and containerboard sales.

Operating problems haunted performances of several mills, including Bowater Inc. at Calhoun, Tenn., Federal Paper Board Co. at Augusta, Ga., and Union Camp Corp. in Savannah, Ga., and Eastover, S.C. Boise Cascade Corp.'s income plummeted 78% as modernizations at Rumford, Maine, and International Falls, Minn., added expenses at a time of declining demand. Champion International Corp. continued to be plagued by economic reforms impacting its Brazilian operations, and the company experienced labor-related operating difficulties at mills in Sartell, Minn., and Deferiet, N.Y. Among the quarter's few benefactors were Pentair Inc. and Mosinee Paper Corp., players in printing and

U.S. paper/products industry results.

	Third-quarter 1990 ($000)[1]			
Paper companies	**Sales 1990**	**% change**	**Earnings 1990[1]**	**% change**
Badger Paper	$19,647	3.6	$705	−43.6
Boise Cascade	1,054,010	−2.5	13,860	−77.9
Bowater	346,558	−3.8	23,659	−33.3
Champion	1,293,711	−1.5	62,462	−38.8
Chesapeake	215,948	5.0	3,010	−75.8
Consolidated	236,075	3.2	38,854	−7.3
Federal Paper	294,218	−0.4	21,948	−55.3
Gaylord Container (4th Q)	201,600	5.1	(5,800)	NM
Georgia-Pacific	3,430,000	29.6	95,000	−46.6
P.H. Glatfelter	151,577	5.4	20,164	−8.2
International Paper	3,300,000	13.8	181,000	−15.8
James River[2] (7/29)	1,421,421	3.8	58,850	2.8
Kimberly-Clark	1,575,100	8.4	123,300	13.3
Longview (7/31)	172,627	−2.9	18,185	0.5
Louisiana-Pacific	450,900	−11.6	21,200	−58.8
Mead[2]	1,268,200	5.9	45,800	−34.3
Mosinee Paper	51,715	−10.1	3,332	14.5
Pentair	300,681	0.2	9,456	18.8
Pope & Talbot	140,950	−12.4	3,541	−73.2
Potlatch	314,259	0.3	24,701	−29.7
Scott Paper	1,331,500	6.6	64,800	−55.6
Sonoco Products[2]	415,555	3.2	(28,881)	NM
Stone Container	1,428,600	4.0	19,700	−72.0
Temple-Inland[2]	604,500	22.9	56,500	1.6
Union Camp	707,774	6.1	51,588	−32.2
Wausau (8/31)	85,444	2.9	4,293	1.8
Westvaco (8/28)	592,888	5.0	47,516	−14.4
Weyerhaeuser	2,263,508	−12.1	90,566	−45.7
Willamette	483,628	−0.6	31,274	−40.9
Total	**$24,152,594**	**5.4%**	**$1,095,583**	**−37.1%**

1. Income after taxes, from continuing operations, excluding most significant nonrecurring items where possible. ( ) = loss. NM = not meaningful.
2. **James River Corp.** 1990 income adjusted to exclude restructuring charge of $143.6 million after tax. **Mead Corp.** 1989 income includes a $15.5-million gain related to the sale of businesses. **Sonoco Products Co.** 1990 income includes after-tax restructuring charge of $55 million. **Temple-Inland Inc.** 1990 income includes gain of $200,000 from property and equipment.

specialty paper markets.

"Last year's difficult decision to restructure the company paid off," said Mosinee CEO Richard L. Radt. Orders remained adequate for full operation despite thin backlogs, according to the company. Pentair enjoyed an 18.8% boost in profits to $9.4 million as sales in premium paper markets, including recycled-fiber paper, raised operating income by 61%, the company commented.

Containerboard woes. While Temple-Inland Inc. held its ground in the quarter, its containerboard operating earnings were down 33% from 1989. The company said its slight rise in net income was due to a lower tax rate resulting from consolidation of a bank subsidiary. Gaylord Container Corp. suffered a net loss of $5.8 million in the quarter from effects of higher fiber costs and an increase in net interest expense, the company said.

Price discounting on newsprint, linerboard, and market pulp ate into Stone Container Corp., as profits plummeted 72%. The company said it successfully raised prices on newsprint and retail bags in the third quarter and recently implemented a $30/ton increase on domestic and export linerboard, which is being followed by an increase on corrugated boxes. Chesapeake Corp. saw declining prices for containerboard as well as lower production (resulting from maintenance downtime in the third quarter) but noted that its new tissue machine in Wisconsin performed "ahead of expectations."

A restructuring program at Sonoco Products Co. cost the company $55 million and 500 jobs worldwide, said president Russell C. King. Despite a $29 million loss in the third quarter, the restructuring program, when completed, should save $20 million annually before taxes. A maintenance shutdown at Potlatch Corp.'s Cypress Bend, Ark., mill was expected to have an even larger impact on fourth-quarter results, coupled with downtime at Lewiston, Idaho.

Tissue retains strength. The elimination of its Spruce Falls Power & Paper Co. joint venture from consolidated results boosted Kimberly-Clark Corp.'s third-quarter profits, which rose 13.3% on the strength of the personal care businesses in North America. K-C said that operating margins were better than forecast because of strong performances in certain product lines and the efficient operation of its Coosa Pines, Ala., newsprint mill. Marketing costs increased substantially over third-quarter 1989, K-C said, with promotion of Kleenex premium bathroom tissue starting in early September.

High manufacturing and operating costs at the S.D. Warren Div. continued to weigh down Scott Paper Co., despite an all-time quarterly record for sales for Scott Worldwide's personal care and cleaning business. The S.D. Warren Div.'s sales dipped 4%, Scott said, citing "manufacturing instabilities" at Muskegon, Mich., and Skowhegan, Maine, where expansion projects are close to completion. The U.S. tissue business had an excellent third quarter, the company noted, but income was hurt by general inflationary pressures and "higher marketing expenses related to strong competitive activity."

Profits in Canada nonexistent. Canadian paper industry profits in the third quarter were practically a contradiction in terms as the strong Canadian dollar and an economic recession continued to plague producers. A preliminary survey of 14 Canadian pulp and paper companies by *Pulp & Paper Week* revealed a net loss of C$49.9 million compared with a gain of $287.1 million in the third quarter of 1989. Sales were down almost 11% to C$5.2 billion in 1990 compared with the previous year, the survey showed. The quarter was especially devastating to Noranda Forest Inc., which reported a net loss of $40 million as markets withered in all forest products categories, especially lumber products and woodpulp. The loss also reflected a sharp cutback in pulp production in the third quarter as part of an attempt to reduce inventories.

Abitibi-Price Inc. again lost money, $700,000 in third-quarter 1990, compared with a gain of $13.6 million in 1989. The company said it was hurt by a four-week labor strike at seven mills and soft markets for many products, namely printing paper. Newsprint markets tightened due to the strike, and directory and supercalendered grades were also bolstered in the quarter, the company said. Canadian Pacific Forest Products Ltd. also cited its labor problems as part of a 98% decline in third-quarter income compared with the previous year. Equity in losses of two new joint-venture newsprint mills continued to reduce earnings as kraft pulp and uncoated mechanical paper markets also preformed poorly, the company said. Canada's only successful paper manufacturer was Scott Paper Ltd., which saw income rise 13.5% in the quarter to C$3.8 million. The company enjoyed a "better than expected" contribution from its new Crabtree, Que., recycling plant, which started up in May. ■

Canadian paper/products industry results.

	Third-quarter 1990 (C$000)[1]			
Companies	**Sales 1990**	**% change**	**Earnings 1990**	**% change**
Abitibi-Price	$756,800	−7.3%	$ (700)	NM
Canadian Pacific	605,100	−14.5	1,000	−97.8%
Canfor Corp.	196,600	−22.7	(13,700)	NM
Cascades	209,921	22.2	4,415	−6.7
Crestbrook Forest	51,373	−26.1	3,390	−61.6
Domtar Inc.	574,000	−10.3	(22,000)	NM
Donohue Inc.	139,900	−8.4	5,300	−45.4
Fletcher Challenge	255,500	−28.9	4,000	−86.0
MacMillan Bloedel	719,400	−12.1	6,200	−90.5
Malette		—		—
Noranda Forest	1,078,000	−9.4	(40,000)	NM
Repap	321,900	−3.0	4,500	−77.0
Rolland Inc.[2]	98,570	−8.5	(7,411)	NM
Scott Paper Ltd.	123,308	−1.3	3,833	13.5
West Fraser Timber	135,500	−8.4	1,200	−88.6
Total	**$5,433,372**	**−10.9%**	**($49,973)**	**NM**

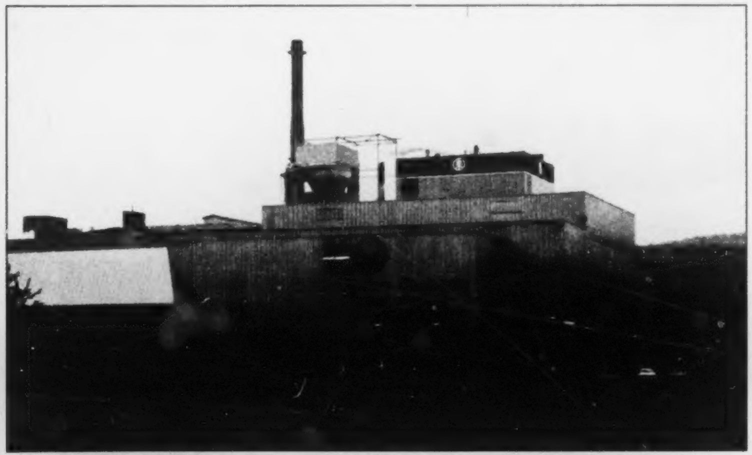
1. Income after taxes, from continuing operations, excluding most significant nonrecurring where possible. ( ) = losses. NM = Not meaningful.
2. **Rolland Inc.** 1990 income includes C$5.7 million provision related to previously reported planned closure of the Mont Rolland, Que., mill.

COATED PAPER

Boise delays Rumford expansion

Boise Cascade Corp. in late October delayed approval for its planned 318,000-tpy coated groundwood paper machine at Rumford, Maine. Final approval for the $450-million project may be delayed for as much as a year, the company said. Boise's decision was based on unfavorable economic and market conditions. The postponement means that no new coated groundwood capacity is scheduled to come online in North America between now and the beginning of 1994, despite generally favorable demand growth. Board approval is now slated for February 1992, and construction would begin shortly thereafter, with completion scheduled for 1994.

Boise first announced the project last year, the first of series of North American projects talked about for the early to mid-1990s. It is now the last to be postponed, following similar decisions at Blandin Paper Co., Bowater Inc., and Fraser Inc. Together, those three machines would have represented about 600,000 to 700,000 tpy of new capacity, had they gone forward. ■



Boise Cascade delayed a coated groundwood paper expansion project at its Rumford, Maine, mill, possibly until 1994.

Repap teaming up with Sierra Club

Repap Enterprises Inc. made a deal with the nemesis of most papermakers—the Sierra Club, which will print its bimonthly magazine on Repap's new recycled lightweight coated paper. This unusual alliance came about because Repap sells its No. 4 coated groundwood, 50-lb offset at virgin fiber prices, rather than the usual 5% to 10% premium charged on recycled grades, thus keeping the magazine's paper costs within budget.

The Sierra Club has struggled with the issue of virgin-fiber paper vs recycled paper but, until now, said that no products met all the criteria to allow the switch. The Sierra Club was attracted to printing quality and the guarantee of a minimum 10% post-consumer waste fiber content. ■

NEWSPRINT

Major producers join newsprint price hike

At the end of October, Kimberly-Clark Corp. and Quebec & Ontario Paper Co., as well as other producers, added their support to the newsprint price hike slated for Jan. 1, 1991. Although a few manufacturers still had not yet announced, those who did made up over 90% of North American newsprint capacity.

Except for Bowater Inc., North American newsprint manufacturers have told customers that list prices will go up $35/metric ton to $720 in the U.S. East and $665 in the U.S. West for 30-lb newsprint. Bowater, however, plans to lower discounts by 4% while maintaining the current list of $685 in the U.S. East. ■

LABOR

Canadian strikes, negotiations drag on

Despite a breakthrough compromise reached between the Canadian Paperworkers Union and Abitibi-Price Inc., contract negotiations in eastern Canada were set back by an Oct. 11 strike of 1,700 employees at Canadian Pacific Forest Products Ltd.'s massive Thunder Bay, Ont., pulp and paper complex only two days after Abitibi workers returned to work at seven previously struck locations. Strikes also continued at CPFP's mills in Gatineau, Que., and Dalhousie, N.B., at Quebec & Ontario Paper Co.'s Thorold, Ont., recycled newsprint mill, and at Rothesay Paper Ltd. in St. John, N.B., which is unrelated to the pattern negotiations.

Canadian workers continued their opposition to pattern contract provisions that call for operating mills on two statutory holidays and give companies greater flexibility in assigning work to tradesmen. Abitibi gained the flexibility provision at the expense of needing union approval to operate the mills on New Year's Day and Labor Day, but workers at other mills appeared to be vehemently opposed to even a compromise on the holiday and flexibility issues.

The CPFP strike at Thunder Bay, coupled with resumption of operations at Abitibi's mills and concurrent strikes at the four other locations, left 17% of total Canadian newsprint capacity idle as of early November, not much of an improvement from around 23% that was off the market in late September. A Canadian Pacific spokesman said the company presented its final offer to the workers on Oct. 10. The issues at Thunder Bay were believed to be similar to the other mills. As of early November, new contracts had been ratified at about 18 of 50 pulp and paper mills represented by CPU in eastern Canada.

And trouble was also brewing at Stone-Consolidated Inc.'s Port Alfred Div. in Ville de la Baie, Que., where Quebec's other major paperworkers union, Le Federation des Travailleurs du Papier et de la Foret (Federation of Paper & Forestry Workers), rejected the company's final contract offer at the end of October. FTPF also had rejected a final offer at Donohue Inc.'s Clermont, Que., mill, and negotiations were dragging at Abitibi's Alma, Que., mill, at Domtar Inc. at Windsor and Donnaconna, Que., and at Kruger Inc.'s Bromptonville, Que., mill. Abitibi also had yet to settle an agreement with the United Paperworkers International Union at Pine Falls, Man.

The Canadian media reported a developing schism between the CPU leadership and workers at Quebec & Ontario Paper's Thorold mill, where 500 workers struck Aug. 14 in opposition to the holiday and job flexibility provisions contained in the pattern agreement. Local Thorold union leaders believe the CPU executives have "morally" abandoned the membership despite continued financial support for the strikers, *The Globe & Mail* reported.

CPU has been plagued by a lack of cohesiveness during the strike, with Ontario workers solidly opposed to provisions that have sailed through locals at Quebec area mills. An FTPF spokesman surmised that in both of the unions, the executives need to be reeducated about the demands of membership.

"People are not very satisfied with their contracts," the spokesman said. "We need to have more discussions with the members."

Q&O spokesman Gary Smith said the company was "caught in the middle" of the disagreement within CPU, and the strike at Thorold occurred "too early in the game."

"We want a contract based on the Stone pattern," Smith said.

Meanwhile, both sides in the protracted strike at Rothesay Paper Ltd. in St. John, N.B., which is unrelated to the pattern bargaining, were called together by a provincial conciliator. But a union negotiator said little progress had been made after several meetings.

"There is no light at the end of the tunnel," the contact said. ■

Canadian mills closed by strikes.

Company/mill	Number of workers	Capacity (metric tpy)	Grade(s)
Canadian Pacific Forest Products			
Thunder Bay, Ont.	1,500	417,000	Newsprint
Dalhousie, N.B.	775	340,000	Newsprint
Gatineau, Que.	1,250	565,000	Newsprint
Quebec & Ontario Paper			
Thorold, Ont.	500	310,000	Newsprint
Rothesay Paper			
Saint John, N.B.	400	320,000[1]	Newsprint
Newsprint capacity down		**1,792,000**	
% of total Canadian newsprint capacity			**17%**

1. Company is operating one of two machines.

Union coalition ratifies pact at Rayonier-Jesup

A three-union coalition representing over 800 workers at ITT Rayonier Inc.'s Jesup, Ga., paper mill ratified a new five-year contract Oct. 5 that lifts wages about 13% by 1995. The unions approved the pact by a "wide margin" the company said. Wages will go up 3% in the first and fifth years of the contract and 2.5% in each middle year.

"We are happy that the result was a mutually agreeable package," said a spokeswoman for ITT Rayonier. "We're looking forward to five years' stability."

The contract also included shift differentials, some improvement to benefits, and modifications to working conditions. The union coalition involves more than 700 members of the United Paperworkers International Union as well as members of the United Assn. of Plumbers & Pipefitters and the International Assn. of Machinists. Another union, the International Brotherhood of Electrical Workers, bargains separately.

Meanwhile, the strike at Rayonier's Hoquiam, Wash., pulp mill continued into its eleventh week last month with no new negotiations scheduled. About 270 members of AWPPW Local 169 struck the Hoquiam mill Aug. 26 over issues surrounding a two-tier wage and benefit structure. ■

KRAFT PAPER

McDonald's will switch to unbleached bags

McDonald's Corp. has notified its suppliers that it will convert all of its carryout bags to unbleached kraft paper from the current bleached kraft paper beginning in the first quarter of 1991. Last August, McDonald's agreed to work with the Environmental Defense Fund to reduce packaging waste, promote recycling, and make greater use of materials, such as unbleached and recycled paper, that are less damaging to the environment. McDonald's napkins and Happy Meal boxes already use recycled paper, but the company has been a frequent target of criticism for using nondegradable polystyrene packaging and contributing to the solid waste problem.

Kraft paper marketing executives were surprised that McDonald's has moved so quickly to switch its bag packaging. "The fat is in the fire," said one observer. Last month, McDonald's was already using natural kraft bags made from 100% recycled fiber for a nationwide promotion of its McRib sandwich, and this month the company will begin testing carryout bags containing 65% postconsumer newsprint at over 500 restaurants in the New York area. Most bag suppliers were equally surprised at McDonald's goal that the natural kraft bags delivered in early 1991 should initially contain as much as 50% recycled wastepaper, increasing to 100% recycled content in the second quarter.

The decision by McDonald's will have a major impact on the kraft bag market. Fast-food restaurants, bakeries, and delicatessens are the largest users of bleached kraft bags, accounting for an estimated 140,000 tpy, or 55%, of the 255,000 tons of bleached kraft bag and sack paper shipments in 1989. Although McDonald's shift will give impetus to the natural kraft paper market, it will hurt the small number of bleached kraft paper producers. Furthermore, some kraft paper mills that do not have recycling systems will be dropped as suppliers of bag paper for McDonald's. The development of 100% recycled kraft paper has been pioneered by a number of small recycled mills. ■

Complex Equipment, New Methods Make Maintenance Training More Important

Survey of North American pulp and paper mills shows commitment to program depends on company, but most support more training

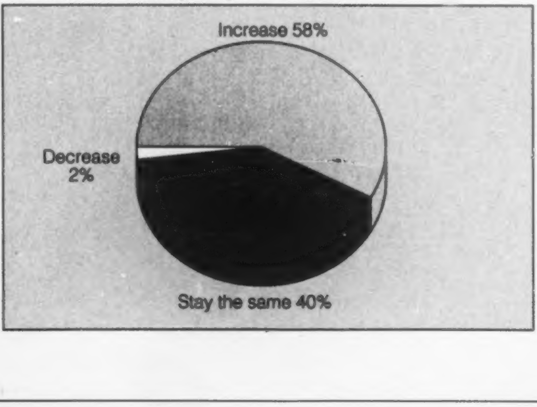
By KELLY H. FERGUSON, Projects Editor

To say that pulp and paper mills have become more sophisticated within the last decade would certainly be an understatement. A look at a process control room of the early 1980s compared with one of today emphasizes the difference in equipment only a decade can make. But process control is certainly not the only area that has changed. Constant research and improved technology have caused redesigns and modifications from the chipper to the roll wrapping system.

Improvements in the pulping and papermaking process have brought changes in the way equipment is maintained. Equipment must be constantly checked and fine-tuned to meet a mill's production and quality goals. Predictive and preventive maintenance is now standard operation at most mills, and sophisticated tools are used to analyze complicated equipment.

Are maintenance employees ready to handle these tools and maintain this complex equipment? A survey of North American pulp and paper mills shows that if employees aren't ready when they report for work, then most companies are willing to spend time and money to train them.

FIGURE 1: **The majority of survey respondents indicated that training would receive more emphasis in the future—58% expected their training budgets to increase.**



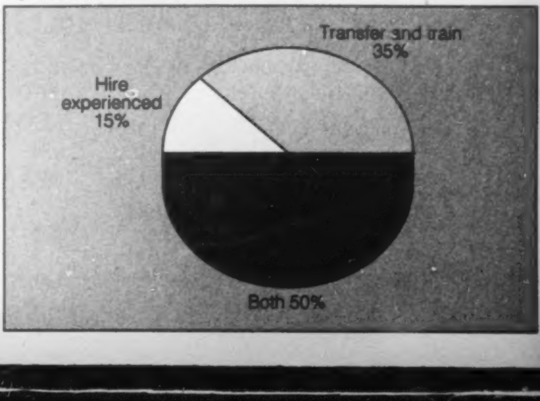
To give an example of maintenance training practices in the pulp and paper industry, *Pulp & Paper* surveyed mills on such topics as how their programs were developed, how much time is spent on training, and what major topics are covered. Mills from 21 U.S. states and three Canadian provinces were surveyed. These mills include a wide representation of the industry:

- Mills representing 17 different grades
- Mills with total production ranging from 90 tpd to 2,500 tpd (short tons)
- Mills with total number of employees ranging from 150 to 2,000
- Mills representing original startups from 1895 to 1985
- Mills with total number of maintenance employees ranging from 28 to 459
- Both union and nonunion mills.

INVESTING IN TRAINING. In analyzing the survey responses, one fact certainly is clear—emphasis on maintenance training is mill or corporate specific and not really affected by any other factors. In attempting to compare mills by such categories as original startup date, union vs nonunion, grades produced, number of employees, region, or total production, no clear comparison could be made.

For example, a 550-tpd fine paper mill in one region with 250 maintenance employees spends more training hours/year/employee than a 2,260-tpd fine paper and coated board mill in another region with 460 mainte-

FIGURE 2: **Mills indicated their emphasis on working with existing employees to fill maintenance positions. Thirty-five percent transfer and train from within, while 15% hire only experienced workers.**



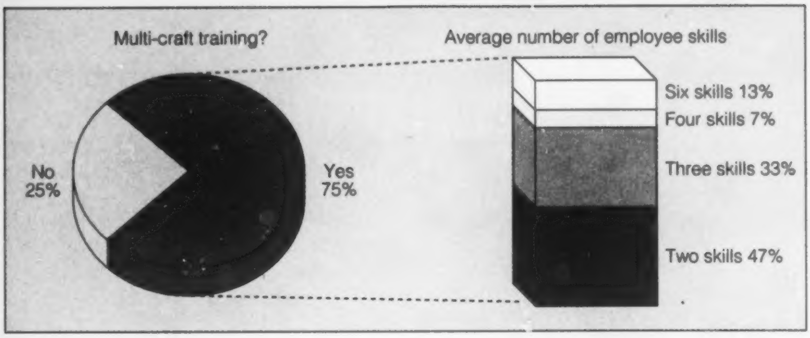


FIGURE 3: **Most mills (75%) practice multi-craft training, and a majority of those mills' employees have more than two skills.**

nance employees. It seems that only a company's commitment to training determines how extensive the program is and how much monetary support it receives.

Most of the mills responding said they had a "formal" training program for their maintenance employees (82.5%). Of the other 17.5% that termed their programs "temporary," most said they were working to develop a formal program. Another comment by those having temporary programs was that training normally occurred only when new equipment was purchased.

Analyzing training program budgets was difficult because some respondents included the total mill training budget instead of maintenance training specifically. This is understandable, though, because some mills have official training departments to handle all mill training. Attempts to figure an average dollar amount based on the number of maintenance employees were therefore impossible. Another possible reason for the wide swings in responses is variations in corporate support. For example, a mill with 90 maintenance employees listed its training budget at $290,000 ($3,222/employee) while a mill with 437 maintenance employees budgeted $500,000 ($1,144/employee).

Most of the respondents (58%) were optimistic that their training budget would increase in the next two years, and 40% expected it to stay the same. Only 2% said their training budget would decrease (Figure 1). A reason given was that the mill recently went through a major expansion and its training budget was increased dramatically for the one- to two-year expansion phase.

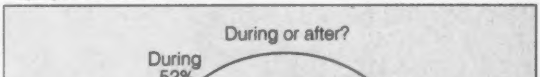
A PROGRAM TAKES TIME. Responding mills train their maintenance mechanics an average of 55 hours/year, E&I personnel 88 hours/year, and maintenance supervisors 49 hours/year. Most of the mills said they also have apprenticeship programs of two to four years to train inexperienced employees. To maintain a healthy maintenance staff, mills either transfer from within other mill departments (35%), hire experienced maintenance employees from outside the mill (15%), or utilize both methods (50%) (Figure 2).

Reflecting the trend in maintenance departments toward multi-craft employees, trainees at 75% of the mills go through multi-craft training (Figure 3). Most of the maintenance employees have two skills (47%), three skills (33%), four skills (7%), or six skills (13%). Multiple skills mean more pay at some mills, with 37.5% of the mills paying maintenance employees for the number of skills they have.

Training normally occurs during working hours—52% of mills responding said they conduct their training programs during working hours only, and another 45% conduct their programs both during and after regular working hours (Figure 4). Only 3% run their programs after hours only. Of those same mills, 28% said when they train after hours, they pay for overtime. At 48% of the mills, completion of the training program is not rewarded. However, 20% of the mills reward employees with a wage increase, and 33% reward with both a wage increase and a promotion of some type (Figure 5).

A WELL-DESIGNED PROGRAM. Various options for developing a training program are available for pulp and

FIGURE 4: **Most training occurs during normal working hours, and of those mills training after hours, most said they paid for employee overtime.**



paper mills—training companies and consultants are willing, at a price, to aid mills in designing a total program. Equipment vendors usually offer some training with purchases. State agencies also usually offer their resources and assistance as an incentive for further expansion in the state. For example, Southeast Paper Manufacturing Co. in Dublin, Ga., Alabama River Newsprint in Claiborne, Ala., and Newsprint South Inc. in Grenada, Miss., all have utilized state resources to develop and conduct training programs.

An option many surveyed mills mentioned was local vocational/technical schools or area colleges. These schools are especially valuable for teaching fundamentals to inexperienced employees.

Most mills (62%) said they developed their maintenance training program with the help of a consultant, and 33% said the program was designed by the mill itself or based on a corporate program. Only 5% said they left development to a consultant.

On-the-job training is still the most utilized method for training maintenance employees. Respondents were asked to rank in importance training methods from seven categories: in-house seminars conducted by employees, in-house seminars conducted by a consultant, offsite seminars, video training, on-the-job training, interactive video training, and other methods.

On-the-job training was chosen by 46% of the respondents as their primary training method (Figure 7). The second choice was in-house seminars conducted by consultants (23%), followed by in-house seminars conducted by employees (18%), outside seminars (5%), and videos (3%). Other methods included local colleges or technical schools and state programs, and one mill used a self-study program. Almost all methods were used by all mills responding. Even interactive video, a relatively new technology in training, was either the third, fourth, or fifth choice for 20% of the mills.

Training manuals, normally a centerpiece of any training program, are developed in various ways (Figure 8). Twenty-six percent of respondents developed their manuals in-house using the expertise of employees to put information together. Thirteen percent relied on vendor-provided manuals, and 11% relied only on consultants. The remaining 50% was divided in a number of combinations of in-house, consultants, and vendors. Of those mills using a combination approach, mill/vendor and mill/consultant teams composed 16% each. Twenty-six percent used vendors and consultants, and 42% used a mill/consultant/vendor team.

Videos are also a popular training method—almost all respondents said they used videos as part of their maintenance training. These videos are most often purchased from a training company (72%). However, with video recording equipment prices decreasing and with more "would-be directors" becoming proficient using that equipment, mills are developing their own site- and equipment-specific maintenance videos. Twenty-one percent of the respondents said they worked in tan-

FIGURE 5: **Incentive can sometimes be an important factor in training. Most mills offer either a wage increase or an increase and promotion for completing training.**

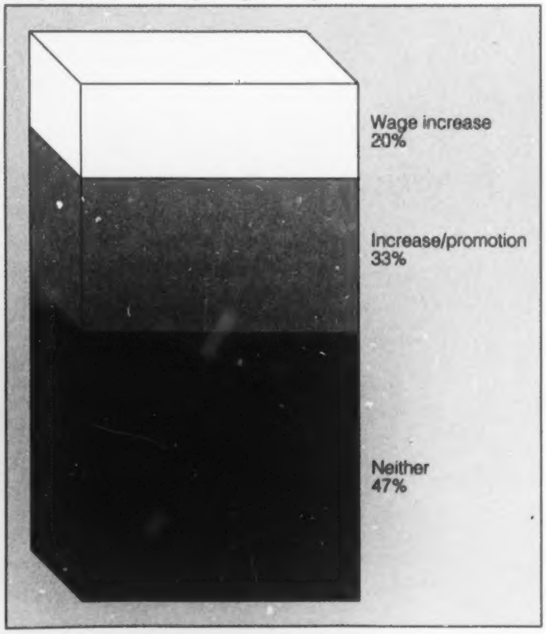


FIGURE 6: **Designing a training program is normally accomplished by a mill/consultant partnership, but 33% of the mills developed their programs alone.**

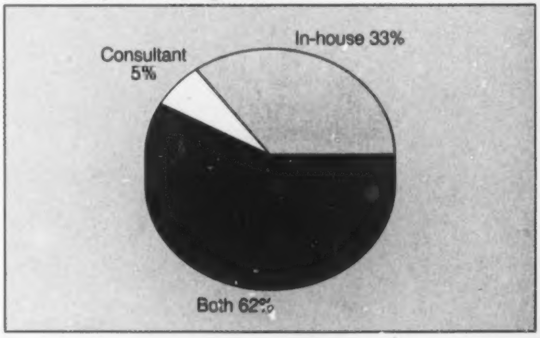
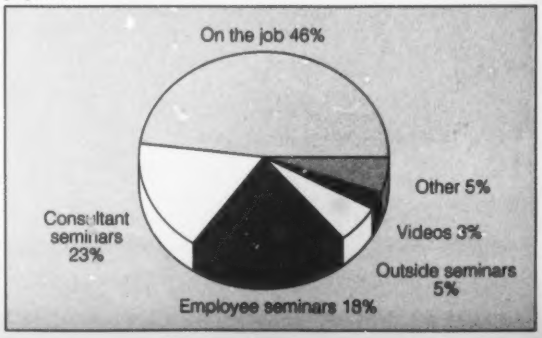


FIGURE 7: **On-the-job training remains the primary method for teaching maintenance skills. But seminars are also becoming popular.**



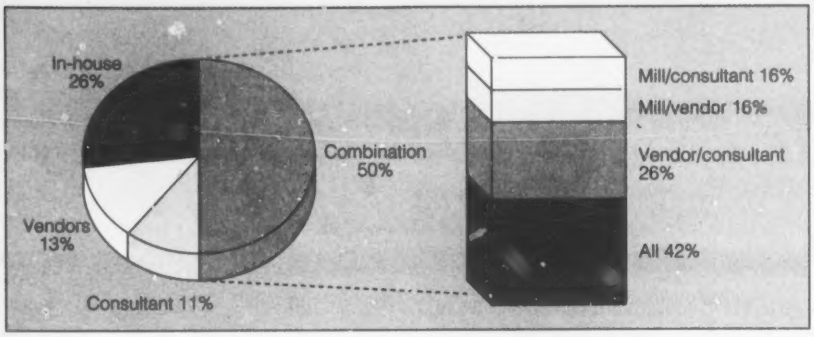


FIGURE 8: **Training manuals are an important part of any training program. In developing these, mills remain involved, and 26% write their own manuals.**

dem with training companies to develop videos, and 8% said they produced the videos themselves.

As training has become more formalized in the industry, more mills have set aside or added facilities dedicated to training, sometimes including special areas for hands-on training within those facilities. Seventy percent of the mills said they had a facility dedicated to training on-site.

Of those that have a training facility, 50% have installed maintenance-specific equipment to aid their training classes. The equipment includes computer control simulators, programmable logic controllers (PLC), hydraulic trainers, duplicates of field instrumentation equipment, simulators for electrical troubleshooting, pumps for hands-on alignment and teardown, and balancing and alignment jigs. One mill commented, "We have basically the same equipment in the training facility as we have in our shops, but on a smaller scale." Mills that don't have specific facilities use the maintenance shops for hands-on training.

The equipment listed previously indicates various topics mills must cover when training their maintenance employees. Each mill may have its own emphasis for training, but most programs cover common topics. When asked to mention the five most covered topics in their maintenance training programs, respondents listed equipment alignment (47.5%) and safety (37.5%). Other major topics listed were computer controls/distributed control systems (32.5%), instrumentation fundamentals (32.5%), welding (32.5%), electrical fundamentals (30%), hydraulics (30%), bearings (25%), and a.c. and d.c. drives (20%).

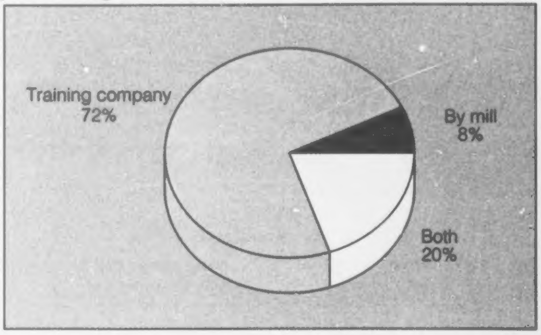
EXPERIENCE VS KNOWLEDGE. In a mill maintenance survey conducted by *Pulp & Paper* in 1980, respondents commented that new, younger applicants had a better knowledge of the trades but not enough practical experience. The 1990 survey asked the question: "It has been said that younger employees are not as well skilled as they once were. Are there any basic skills new employees are not familiar with, such as mathematics, basic electrical principles, understanding instrumentation, etc.? If so, how are these employees educated?"

About half of the respondents disagreed with the statement, which is very encouraging. Many mentioned that local technical schools or colleges were invaluable in teaching those basic skills. And many also said the mill paid for trainees to attend those classes.

Some of the comments follow:

- "Math skills. Training is provided in-house by mill employees."
- "Our maintenance apprenticeship program requires four years of night classes."
- "New employees do not have the electrical, instrumentation, hydraulic, and mechanical skills. We must train the new employees in those areas."
- "Some topics we must cover are reading, language skills, and mathematics."
- "Problem-solving skills are very weak. We [have] overcome the problem of poor skills through entrance testing."
- "We feel that the younger employees with training can easily adapt to new technology."
- "New employees need to work on math skills, writing skills, and reading comprehension. But we have no formal program for dealing with these."
- "We provide a basic math refresher course. Tests in math, electrical fundamentals, and instrumentation are given to beginners to establish the training threshold."
- "Employees need training in basic troubleshooting skills and an analytical approach to problem solving. We are developing a training program to deal with these areas."
- "By screening and testing applicants, we have been able to hire employees with the necessary skills. While this has not been a problem so far, it could be a problem

FIGURE 9: **Training companies are still the major source of training videos, but like many other areas, mills are personalizing their videos.**



in the future."

- "A percentage of the younger employees do not like responsibility and have a poor attitude toward learning. As long as they feel they have a strong union behind them for protection, they will never make a good employee. We have to work around that problem by appointing them work they are capable of performing."

PREPARING FOR NEW TECHNOLOGY. As mentioned earlier, new technologies have made a difference in the way maintenance departments operate. With a trend toward prediction and prevention, sophisticated tools have been developed—computer alignment, online conditioning monitoring, infrared analysis, etc. The survey asked mills to relate how these changes have affected their training programs and the subjects they cover:

- "More detailed training, both onsite an offsite, for our paper machine maintenance crew in vibration analysis for rotating equipment. Training of craftsmen on computer alignment."
- "We send more of our employees offsite for training, and our paper machine team undergoes more varied training."
- "We have expanded training in the paper machine area to keep abreast of new equipment and application technology. New apprentices are being taught laser alignment techniques."
- "Requires more one-on-one, in-depth training for all mechanics."
- "We have a separate in-house PPM program with a team of six to seven technicians. These technicians receive more specialty training than other maintenance employees."
- "For the more advanced technologies and maintenance equipment, we have trained a core group of employees. We're now bringing others along at a slower pace. They will be developed as far as their interest takes them."
- "We constantly upgrade our program to reflect changing technology."
- "We have used outside resources for training on vibration analysis, etc."
- "Since this is a new mill, use of sophisticated tools has been a way of life for us. Our training program is designed to offer both elementary subjects for the benefit of younger, less-experienced people and advanced topics geared toward improving skills of the more experienced team members."
- "This has increased the amount of training, but it is provided to a small specialized group as opposed to the general crew."
- "These new technologies have been added to our maintenance program, resulting in additional classroom hours required for all craftsmen during and after their apprenticeship programs. E&I employees now require more than 800 hours of classroom training." ■

Unique training methods

The final survey question was asked in an effort that mills share some of the unique aspects of their training programs—special "points of pride" that have made their programs work. Below are some of the responses:

- "Certified welding training, testing, and documentation of certified welding jobs."—Southern fine paper mill
- "When we go into a major expansion, we set up special training for E & I apprentices. We take people out of the mill, and, using in-house training, vendors, [and] vocational school classes, we develop highly skilled E & I technicians in 18 months. We have done this twice—once with 11 apprentices and once with eight apprentices—with excellent results."—Midwestern tissue mill
- "For maintenance, it is our five-year maintenance apprenticeship program. Normally, all maintenance employees are hired into the program and must show satisfactory progress with on-the-job training, and while attending formal classes at night for four years. This program has been in place since 1959, and it is, by far, the best ongoing training program at our mill. We believe it may be one of the best programs of its type in the industry."—Southern kraft bag and linerboard mill
- "It is unique in that we have not gotten a formal, planned, scheduled training program off the ground yet. We just, in the past week, received approval for specific training to improve the skills of both mechanics and electricians. This includes interactive training on hydraulics and programmable controllers. Also, we will have a dedicated area for our training equipment."—Southern board mill
- "Due to redesign projects in both E & I and mechanical areas, our training programs are being completely changed to reflect the needs of our multi-skilled mechanics."—Northeastern coated paper mill
- "From 1986 through 1989 we put our maintenance employees through a cross-craft training program. I feel this has given our work force the ability to meet our mill's maintenance needs. We keep them up to date on new technology by seminars and training programs provided by vendors."—Southern kraft mill
- "Key maintenance employees receive operator training on new processes. Electronic technician group received advanced training in E & I. They can be called to any problem millwide. Training to update and remain up to date equals about three to four months/year/man."—Southern bleached pulp and board mill
- "Solicitation of employee's ideas before selecting a subject for training purposes."—Southern tissue mill
- "Our training opportunities can be divided into two types: 1) Advancement By Competency (ABC): This training is done on team members' own time. By completion of designated modules and time on the job, a team member can advance through 11 pay steps to reach the top pay step. Most of the modules are "generic" to the types of equipment found in pulp and paper mills; 2) Company-sponsored training: This training is paid for by the company and focuses on specific topics for which specific needs exist within the mill."—Southern pulp mill.

New Corrugated Box Rules Could Mean Big Change for Containerboard Mills

Modified corrugated box regulations based on edge crush rather than bursting strength of the walls are expected to be approved in early 1991

By COLE ROWLAND

Regulations governing the construction of corrugated shipping containers used in commercial truck and rail shipments have, since their inception in 1906, been based on basis weight and the bursting strength of the walls of the container. Bursting strength, as measured by the mullen test, measures the ability of the container walls to resist rupture.

While bursting strength of the box may have been the critical specification in box design in the past, box makers, box users, and carriers all seem to agree the most important design criterion for corrugated boxes today is vertical compression strength.

Box makers, box users, shippers, and regulators have agreed for some time that box shipping regulations should be changed to include a criterion for edge crush of the combined board. Edge crush correlates with both the ring crush of the linerboard and the top-to-bottom compression strength of the finished box. However, achieving a change in the shipping regulations has proved to be an elusive goal.

WHY REGULATIONS? The regulations themselves were initiated by the Freight Classification Committee of the railroads shortly after the turn of the century. These regulations are now contained in Rule 41 of the railroads' Uniform Freight Classification.

For many years, the trucking industry had no comparable regulations to Rule 41 of the railroads. As the truck lines increased their share of commercial shipments at the expense of the railroads, their acceptance of shipments packed less securely than required by the railroads was a means of competing with them for business. Damage claims eventually forced the truckers to adopt their own set of rules, similar to those of the railroads. These are contained in Item 222 of the National Motor Freight Classification, published by the National Motor Freight Assn.

Under both common and statutory law, a common carrier is responsible for loss, damage, or injury to the goods it accepts while those goods are in the carrier's possession. To protect themselves from this liability, the carriers are allowed, under the authority of the Interstate Commerce Commission, to establish rules defining the minimum construction of shipping containers.

Some 95% of all manufactured products are packed in corrugated cases, and the preponderance of all goods presented for commercial shipment are in corrugated boxes. While the purpose of the regulations is to allow the settlement of damage claims, in the absence of other regulations or standards, the rail and truck regulations have for many years been accepted as the standard for corrugated box manufacture in this country.

REASONS FOR CHANGE. Several reasons exist for changing the shipping regulations for corrugated boxes, and some of these are outlined below:

Changing transportation environment. When the railroads first defined their shipping regulations, goods were mostly loaded on the floor of railcars by hand in individual packages. Now, most shipments are unitized and handled by forklift or mechanical conveyor. Unitized loads are stacked high in warehouses under a variety of atmospheric conditions.

The trucking industry has gone through times of economic stress since its deregulation during the Reagan administration. The pressure to load trucks to capacity has increased as the competitive pressures have intensified. The various energy crises have added incentives to ensure loads approach capacity in every case.

Changing primary packages. The replacement of rigid primary packages with nonrigid packages has been a well-established trend in the U.S. for some time. Pouches and other flexible packages have offered economical alternatives to certain rigid paperboard packages, particularly in the prepared foods area. More importantly, blow-molded containers have replaced rigid steel, paperboard, and glass packages in a number of major applications.

An example is retail motor oil, which in the 1970s

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was packaged entirely in steel and composite cans. Within the span of only about four years, the cans have been virtually 100% replaced by blow-molded bottles. While the cans were self-supporting, the quart bottles depend upon the compression strength of the shipping container for support in stacked loads. Similar conversions have also taken place in cooking oil, syrup, and soft drinks.

Solid waste source reduction. Boxes made with high-performance containerboard (HPC) may save 20% of the fiber used to make boxes with comparable stacking strength made from traditional linerboard and medium. This is an important means of responding to pressure from customers and legislators for packaging source reduction.

The containerboard industry has a potential problem with respect to its role in the nation's municipal solid waste crisis. In 1940, about 40% of the raw materials consumed by the containerboard industry were recycled materials. In response to the demand for greater performance in corrugated packaging, the percentage of recycled materials consumed in U.S. containerboard had dropped to 23% by 1989. The American Paper Institute (API) expects that figure to increase to 25% this year and 35% by 1995.

These are ambitious goals for an industry that competes on the basis of strength and performance, and it is conjectural whether, if achieved, they will be sufficient to keep various government bodies from mandating secondary-use quotas.

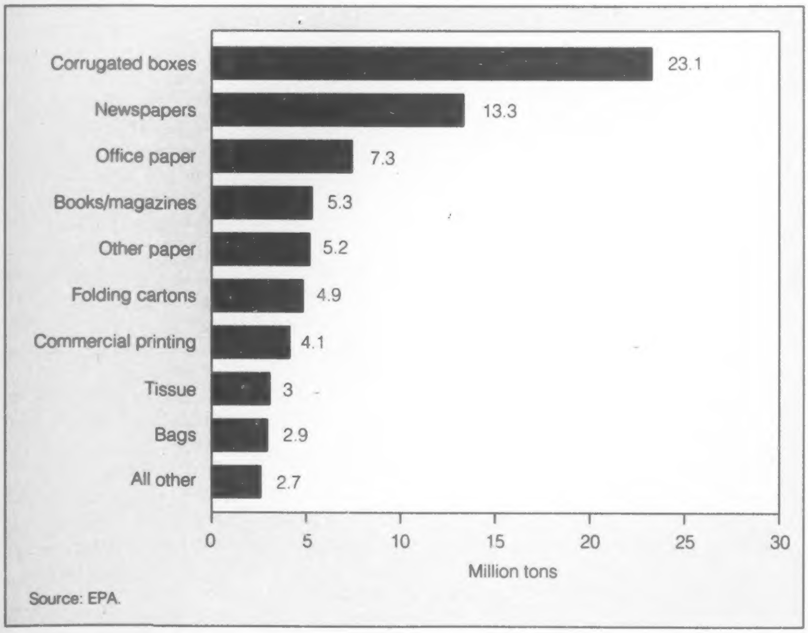
The corrugated box industry has an excellent story to tell in terms of the percentage of used boxes recovered and recycled. Old corrugated containers (OCC) recovery was more than 45% in 1988, compared with some 33% for newspapers, and the recovery rate for OCC increased to more than 50% in 1989.

Still, many in the containerboard and corrugated box industries consider themselves prime targets for mandated quotas for use of more recycled raw materials because corrugated represents such a large share of total municipal solid waste. Figure 1 shows corrugated boxes are by far the largest single paper product entering the solid waste stream, accounting for more than 23 million tons in 1988. The next highest volume among paper products was newspapers at just over 13 million tons.

In terms of discards (unrecovered materials), corrugated boxes are about as large as total food wastes, and almost as large as all plastic material wastes combined (Figure 2).

Raw materials conservation. Offering edge crush as an alternate criterion in the shipping regulations would help conserve containerboard raw materials in two ways. One is the reduction of overpackaging, which one industry executive believes is present in 50% of all 200-lb test containers. Because the current regulations use basis weight and bursting strength as their criteria, containerboard machines must be run to optimize these specifications rather than ring crush.

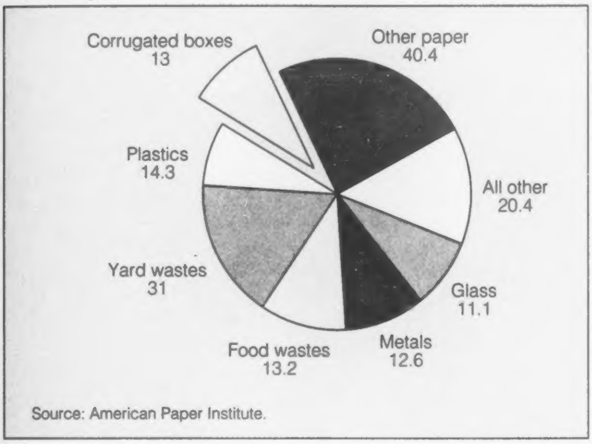
Consequently, box users interested in compression strength may be forced by the existing regulations to



Source: EPA.

FIGURE 1: **Paper and paperboard products generated in MSW—1988.**

FIGURE 2: **Landfill volume of discards in MSW—1988 (million tons).**



Source: American Paper Institute.

buy more fiber than would be needed if the liner were run to a ring crush specification. The new high-performance (high ring crush) grades of linerboard typically produce ring crush test results comparable to conventional grades of linerboard at basis weights 15% to 20% below those of the conventional grades.

Secondly, the high-performance grades of linerboard are much more tolerant of hardwood fiber in the furnish than are grades of linerboard run to a mullen specification. The addition of hardwood fiber to the furnish has been found to improve the ring crush results of linerboard, apparently because of the bonding characteristics of the hardwood fibers. This seems to be especially true if the linerboard machine is equipped with a high-intensity press. Since hardwood is an underused resource in southern pine timber stands, an alternate edge crush criterion in the regulations would help conserve the relatively scarce and valuable softwood species.

Lower cost to box users. The economics of using high-performance linerboard in box making are such that overall cost savings are typically shared among the containerboard producer, the box plant, and the box user.

Currently, high-performance linerboard is priced at a premium over conventional grades of linerboard by most producers of the HPC grades. Although the HPC grades sell at a premium per ton over conventional grades, their basis weight for a given level of ring crush is sufficiently lower than the conventional grades that the price increase per ton of paper is more than offset by the increased yield of ft² from each ton.

These savings may be kept by the box maker, improving that company's margin. In the very competitive world of corrugated box converting, however, the box plant will more likely share these savings with the box customer, who then receives a box with equivalent stacking performance at a lower price or better stacking performance at the same price.

Avoiding obsolesence of the regulations. During the 1980s, containerboard pricing made greenfield linerboard mill developments difficult to justify. New capacity came primarily in the form of machine rebuilds and, to a lesser extent, new machines at existing sites.

Two technologies that have dominated linerboard capital projects in recent years are high-intensity pressing and multi-ply forming. It happens that both of these technologies may be used very effectively to enhance the ring crush performance of the sheet.

While it may be going too far to suggest that ring crush performance was the principal reason for the choice of these technologies, their popularity has certainly fostered the availability of, and interest in, high ring crush containerboard.

The explosion of interest in HPC and the large number of permit applications for special packages exempt from regulations threaten to outflank existing regulations.

EARLIER ATTEMPTS TO CHANGE THE RULES. The proposal currently being drafted by the Fiber Box Assn. (FBA) and the Assn. of Independent Corrugated Converters (AICC) is the third attempt to change the shipping regulations for corrugated boxes since 1983.

In 1983, FBA and the Fourdrinier Kraft Board Group of API docketed proposals with the rail and motor freight classification committees requesting that an alternate set of criteria be added to the existing rules. These alternate criteria involved two changes to the existing rules. First, a 20% reduction in mullen specifications was requested to allow greater use of hardwood fiber in linerboard production. Second, a new edge crush specification was proposed in addition to the mullen specification.

The proposals generated a great deal of controversy, both within the paper industry and from box users. The edge crush values were based on an industry survey of actual box production performed by the Institute of Paper Chemistry and were intended to be minimum values. Wording in the proposals, however, described the values as "minimum averages," rather than minimums.

One paper industry executive criticized the proposed rule as downgrading industry quality by allowing "... the stacking strength built into today's boxes to be reduced 17% to 25% and still meet the test." The proposed reduction in bursting strength was also strongly criticized as an attempt to downgrade the overall quality level of the corrugated industry.

The chairman of the Rail Classification Committee wrote the parties to the Docket Subject a letter in November 1983 recommending disapproval of the paper industry proposal. He said, "While there was support for the proposed amendment, the record shows significant opposition from the greater preponderance of shippers and box makers. Moreover, numerous rail carriers have advised their opposition.

"In general, the negative comments indicate opposition to the proposed amendment for the reason that the reduction in bursting tests, coupled with the change to average, rather than minimum, compliance criterion, would result in a degradation of specifications and box performance. In addition, there was opposition to the proposed edge crush levels on the grounds that the proposed values are not representative of current commercial board capabilities.

"This committee is inclined to the opinion that the edge crush test is a valid specification concept. However, it is the view of the Committee that the reduction in bursting tests, in combination with the proposed edge crush test levels, would not serve to provide a satisfactory basis of specifications . . . the Classification Committee has concluded to recommend that [the proposal] be disapproved."

Within a short time, the paper industry submitted a revised proposal to the classification committees. The new proposal again requested a 20% reduction in bursting strength requirements, but the edge crush requirements were modified. Before being submitted to the classification committees, the new proposal was to be field tested through a program entitled, "A Test Program for Corrugated Boxes," involving limited production of the "new board" and its use in producing containers that would be shipped under test permits from the classification committees.

The program was not supported by box makers or box users. Less than a dozen test permits were issued over the three-year life of the test program, and little data of any use were collected.

The independent corrugated box producers were suspicious of changes proposed by FBA and API for several reasons. They saw benefits for the containerboard producers under the proposals but little incentive for them or their customers to support the changes. The independents feared that producers of the "new board," or high-ring-crush linerboard, would restrict the availability of the new linerboard grades to their own box plants or discriminate against the independent box producers through pricing of the new board grades.

THE NEW PROPOSAL. With continued interest in the edge crush test among shippers and carriers, and without any new initiatives from the box industry, the rail classification committee in 1989 drafted a new proposal and submitted it to the box industry and shipper groups for review and comment.

The stated intention of the committee, according to its chair at the time, was " . . . to create some movement toward the eventual goal of publishing a modernized rule with more emphasis on box compression strength."

Changes in the committee's draft proposal included the following:

- Edge crush requirements as an alternative to the current burst test requirements
- Increases in box size and weight limitations, mainly for double-wall and triple-wall board
- Inclusion of three new grades of triple-wall board
- Provisions for the new high-strength linerboards
- "Cleaning up" the rule by the removal of numerous obsolete and extraneous requirements, such as replacement of four pages of detailed box closing specifications with general closing requirements
- Rearrangement of the various sections of the rules so that they progress from basic corrugated fiberboard and box construction and specifications through interior packaging requirements and end with box closing, certification requirements, and definitions.

The response from the paper industry trade associations to the committee's draft proposal was positive, with certain reservations concerning proposed test values and procedures.

The schedule of edge crush values in the draft proposal concerned API. As many as 20% to 22% of all U.S. box orders could have failed the proposed edge crush criterion, based on what API believed to be current U.S. corrugated box performance.

API was reluctant to endorse a schedule of edge crush standards that would rule out almost one quarter of current U.S. box production, for fear of being accused of trying to discriminate against certain producers or attempting to influence competition in favor of other producers. The classification committees were not proposing the rule changes because of any perceived increase in box failures or claims but rather to include edge crush as an alternate criterion.

API proposed that the edge crush values be evaluated through a national survey of the current distribution of edge crush values for each basis weight of linerboard, based on actual U.S. box production. This survey was conducted in 1989 and 1990, and the results were analyzed by an independent statistician at New York Univ.

A new set of edge crush values were proposed by API, FBA, and AICC at the "minus 2 sigma" point on the normal curve of edge crush values found in the survey. This means that about 97% of all current U.S. box production could be expected to pass the edge crush requirements in the new schedule.

By July 1990, there was general agreement among the classification committees and the three trade associations as to what the new rules should contain. Table 1 shows the proposed table of "maximum size and weight —minimum fiberboard requirements" as it appeared in a preliminary draft of the proposed new rules being considered by the committees as of September 1990. The values shown are preliminary and subject to change before the proposal is included on the classification committees' docket for final consideration.

NEW QUESTIONS. The Institute of Packaging Professionals (IOPP), invited in mid-1990 to join the group of sponsoring organizations as the representative of box users, has raised some new questions about the paper industry edge crush values and test procedures.

These questions concern the adequacy of the edge crush values in the paper industry proposal for rule changes. IOPP also questions the proposed test procedure and some other matters relating to the proposed new rules.

IOPP's questions may be resolved prior to docketing the new proposal for consideration by the classification committees. If not, it is possible that IOPP may docket its own proposal for rule changes to the committees, in competition with that of FBA/AICC.

REACTION OF BOX MAKERS. The International Corrugated Packaging Foundation (ICPF) held a symposium in Chicago, Ill., in August 1990 on various subjects of interest to box makers. Among the papers presented was one on the proposed changes in the shipping regulations for corrugated boxes. The comments and questions brought up at that meeting are probably representative of the concerns that U.S. box makers currently have.

Concerns expressed at that meeting fall into several categories, including quality and testing, operational, and marketing. One independent sheet plant owner asked if he would now have to spend $100,000 to equip his plant with a new testing laboratory to make sure that "... board run through here complies."

Independent box producers were acutely aware that a change to edge crush specifications brings with it a significant shift in the responsibility for compliance from

TABLE 1: **Boxes must comply with the burst or puncture test and other requirements of Part A, or, alternatively, must comply with the edge crush and other requirements of Part B.**

PART A

Maximum weight of box and contents (lb)	Maximum outside dimensions (length, width, and depth added) (in.)	Minimum bursting test, single-wall double-wall or solid fiberboard (psi)	Minimum combined weight of facings, including center facing(s) of double-wall and triple-wall board (lb/1,000 ft²)
		Minimum puncture test triple-wall board (in. oz/ in. of tear)	Minimum combined weight of plies, solid fiberboard, excluding adhesives (lb/1,000 ft²)
Single-wall corrugated fiberboard box			
20	40	125	52
35	50	150	66
50	60	175	75
65	75	200	84
80	85	250	111
95	95	275	138
120	105	350	180
Double-wall corrugated fiberboard box			
80	85	200	92
100	95	275	110
120	105	350	126
140	110	400	180
160	115	500	222
180	120	600	270
Triple-wall corrugated fiberboard box			
240	110	700	168
260	115	900	222
280	120	1,100	264
300	125	1,300	360
Triple-wall corrugated fiberboard box			
20	40	125	114
40	60	175	149
65	75	200	190
90	90	275	237
120	100	350	283

PART B

Minimum Edge Crush Test (ECT) (lb/in. width)	Maximum weight of box and contents (lb)	Maximum outside dimensions, length, width, and depth added (in.)
Single-wall corrugated fiberboard boxes		
23	20	40
26	35	50
28	50	60
30	65	75
36	80	85
43	95	95
52	120	105
Double-wall corrugated fiberboard boxes		
40	80	85
45	100	95
48	120	105
61	140	110
71	160	115
82	180	120
Triple-wall corrugated fiberboard boxes		
67	240	110
80	260	115
90	280	120
112	300	125

Note: As this issue went to press, the Freight Classification Committee adopted different proposed regulations than those shown in part B.

The above values have been docketed by the rail and truck classification committees but are preliminary and subject to change. A second, competitive proposal has been submitted by the Institute of Packaging Professionals and the American Society of Testing Materials.

the linerboard supplier to the box maker. The box plant can do relatively little in the conversion process to diminish bursting strength of a sheet, but good edge crush results depend heavily upon good technique and good equipment in combining, printing, and finishing the combined board.

Apprehension was expressed as to what information about rolls of high-ring-crush linerboard would be provided to the converters by linerboard suppliers and how this information could be used to ensure compliance with the new shipping rules. More than one test for ring crush is in use among U.S. producers of linerboard, and there was uncertainty about how ring crush test results for the roll stock should be used to predict edge crush for the combined board or top-to-bottom compression strength of the finished box.

It was pointed out that the new edge crush rule was offered as an alternative to the mullen/basis weight rule and that the existing rule would remain in effect for the time being. Some skepticism was expressed as to how long the mullen rule would remain in the regulations once the edge crush alternative was available.

The operational problems with an edge crush compliance requirement included the obvious problem of more care needed in combining, printing, and finishing in order not to destroy the potential edge crush performance built into the raw materials purchased by the converter.

Means of identification of edge crush and mullen rolls in the box plant inventory was a concern of some, as was the problem of identifying edge crush sheets in a sheet plant.

The question of what certificate to print on boxes now (before the new rule goes into effect) was answered by one box plant operator, who reported that he used a stamp on his edge crush orders that said, "This box is made from materials that have the top-to-bottom compression values of a 200-lb test container." The necessity for trimming the paper machine for high-performance linerboard orders as the new grades are phased into a box plant's business was a concern.

There seemed to be a trend toward use of single sources of supply for containerboard and the formation of "partnerships" between mill and box plant. Similar relationships were described between box makers and customers who desired custom board combinations for their containers.

Initial fears among the independent converters about availability of high-performance materials have largely been put to rest. Since the early 1980s, when AICC was an adversary to the proposed rule change, most of the mills producing HPC have decided to make their sheets available to converters outside their own company.

Marketing considerations discussed at the symposium included the need for sales training about the new rules and new materials and the question of whether to offer the high-performance sheets as a means of improving stacking strength or as a means for box customers to reduce their cost of packaging.

The independent corrugator operators differed as to how aggressively to promote edge crush containers. One operator reported having converted 100% to HPC raw materials and having improved his margins with the savings that the improved yield provided. Local competition forced another to pass on to customers all of the yield savings from his HPC orders, and then some.

Comments about the rule changes ranged from "fabulous opportunity for independents" to "single most difficult issue of the decade."

ISSUES FOR CONTAINERBOARD PRODUCERS. The new regulations are expected to be approved in early 1991. Following the formal approval, the impact on containerboard producers will depend on several factors, including the degree to which box makers and box users become aware of the significance of the change, the degree to which box users have already circumvented the existing rules through the use of special permits, exemptions and materials, and the degree to which the containerboard and box industries promote the use of HPC materials and packages to their customers.

The ability to produce high-ring-crush containerboard profitably varies widely among individual companies and mills in the containerboard industry. Some companies have aggressively promoted HPC for 15 years, while others remain on the sidelines. Those companies equipped with multi-ply linerboard machines and high-intensity presses have the option of using that capacity to make conventional board at reduced operating and raw material cost or to produce HPC materials. As long as the HPC market remains a premium-priced specialty niche, most of these companies will likely produce HPC to the extent that the market demands it and enjoy a lower cost on the balance of its production.

At least one major producer of linerboard has chosen to convert its entire linerboard system, except for the lightest weights, to the production of a grade of linerboard that has at least 2 lb of ring crush for each pound of basis weight, the generally accepted definition of high-performance linerboard.

There is reason to expect an increase in the importance of corrugating medium in the industry relative to linerboard as box users become more aware of the economics and engineering of compression strength in corrugated boxes. Basis weights, now standardized, will proliferate as differences among the mills in their ability to make high-ring-crush board become apparent.

Some slowing in the tonnage growth of the containerboard industry may be expected as box users eliminate overpackaging caused by old regulations. The situation is analogous to a period in the 1980s when the development of new polyethylene resins allowed progressively lower gauges for all types of plastic film applications. Film growth continued, while resin growth slowed.

The containerboard industry is very likely to experience a shift in grade mix, basis weight mix, and total volume as a result of the change in the rules. The extent and timing of these effects remain to be seen. Some factors would seem to indicate an early and significant change in the containerboard business. Currently, HPC is probably the fastest growing segment of the containerboard business. Whether because of the existing regulations or other reasons, it is believed that overpackaging exists in as much as half of all corrugated boxes in use in this country.

Box plants, while apprehensive about the mechanics of making and selling high-ring-crush orders, have an opportunity to increase margins for orders switched to the new materials, as they do for any specification change. Box users who have not already switched specifications to take advantage of the new HPC materials can reduce their packaging cost, or increase the performance of their packages, or possibly both.

Other factors indicate that the ripple in containerboard volume and grade mix caused specifically by the rule change may not be noticeable. Many of the larger and more sophisticated box users have already changed box designs and materials to circumvent the existing rules or are using transportation modes not subject to the rules.

HPC grades still account for only a small fraction of total linerboard, and the introduction of new concepts and materials takes time in any industry, especially in a mature industry such as the corrugated box industry. The level of awareness about the upcoming changes among the smaller box users is probably not high at this time. The smaller box users typically default to the shipping regulations rather than investing time and money into developing their own specs, and it is this group that probably accounts for the bulk of whatever overpackaging exists.

CONCLUSION. Paper industry associations seem confident that the proposed rule changes will become a reality shortly after the first of 1991. Whatever differences remain about edge crush specs seem likely to be worked out very soon, if not worked out already. The regulation change will accelerate the already rapid growth of HPC.

HPC, as currently defined, will become another commodity grade, and its specialty status will move to those newer grades of "super HPC" that offer less variability in specs, better print surface, and better runability, in addition to improved ring crush. Linerboard mills will be differentiated by their ability to make good ring-crush board at low basis weights. As one box maker put it, "The [containerboard supplier] who comes in with fewer pounds of paper, and just talks about compression, is going to win the race." ■

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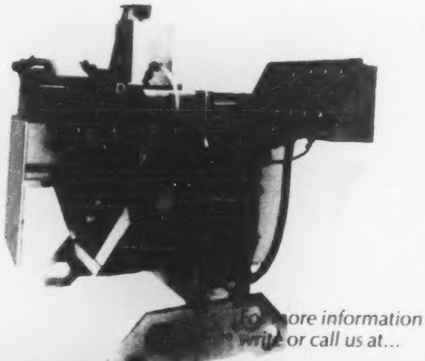

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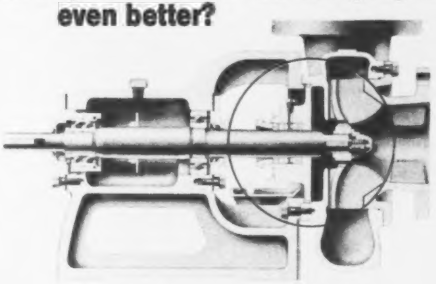

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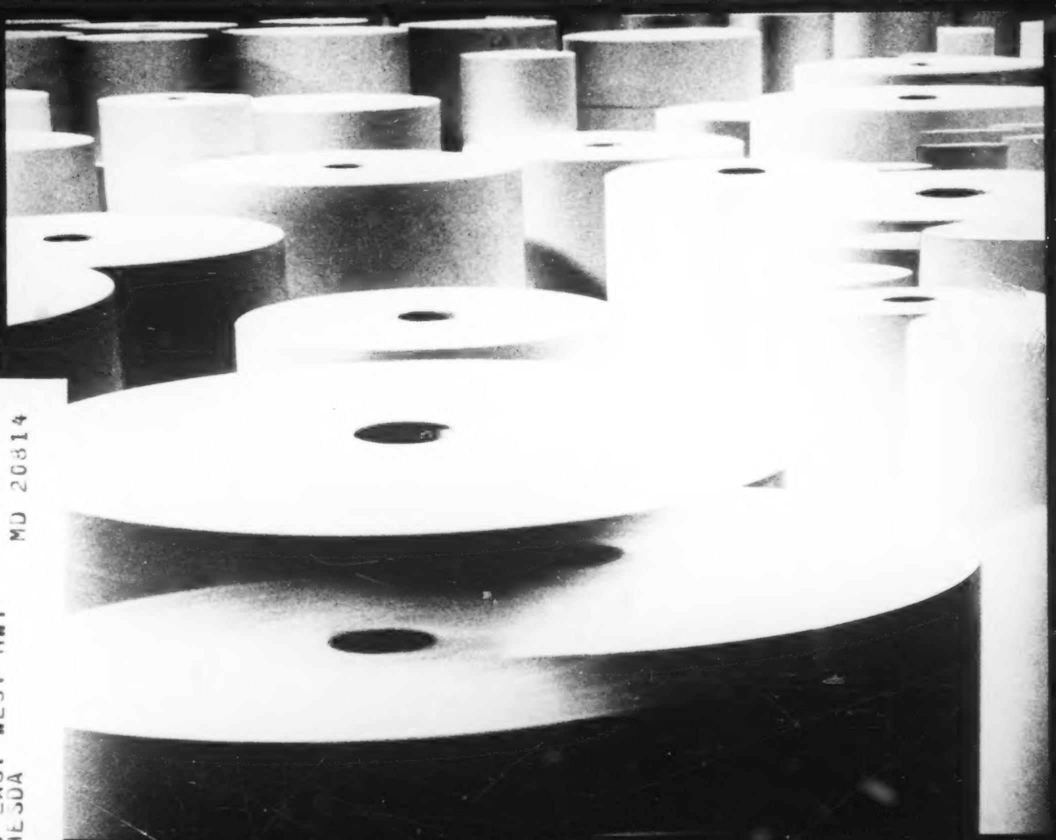

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Capital spending declines after seven record years • 101

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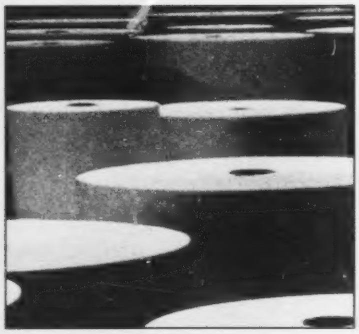

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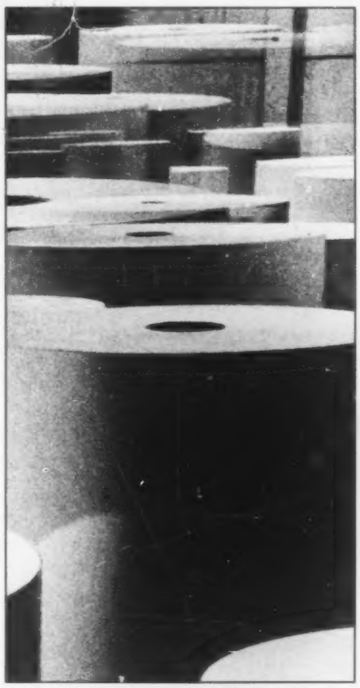

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This issue's Outlook '91 (p. 57) and Capital Spending (p. 101) reports examine an expected decline in operating rates, earnings, and modernization/expansion outlays this year, as well as several positive factors, such as a continuing weak dollar on the European market—concluding that the North American paper industry should remain basically healthy and competitive this year. (Photo courtesy of Jagenberg Inc.)

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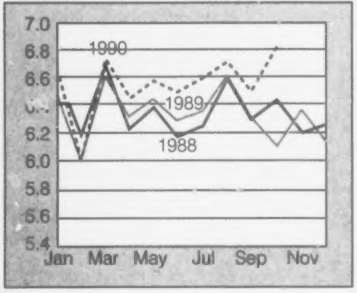
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.8 million tons in October, up 3.1% from a year earlier, according to the American Paper Institute. The seasonally adjusted rate of production reached a new high of 78.3 million tpy. Production has strengthened all year, especially since July, despite the slowdown in the general economy. Demand indicators for paper and board grades are up 2.3% and 1.0%, respectively, over last year. Producers have maintained low inventory levels so that current output flows directly to consumption, API reports.

Among major grades, newsprint production was up 8.6% due to the startup of four new machines since mid-1989. Printing and writing shipments posted a 3.5% increase over last year, on the strength of a 5.0% rise in coated paper shipments and a 3.8% increase for uncoated free-sheet. Containerboard leads the paperboard grades, with production up 2.2% through October.

Canadian newsprint shipments totaled 710,000 metric tons in October, down 16.7% from the same month last year. Operating rates plunged from 98% last year to just 80%. Woodpulp shipments were up 3.2% to 705,000 tons, with operating rates falling to 82%, down from 90% in October 1989. ■

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Oct.	563	7.0	6,569	8.6
Uncoated groundwood (s)	Oct.	168	0.6	1,763	0.0
Coated paper (s)	Oct.	689	5.5	7,572	5.0
Uncoated free-sheet (s)	Oct.	1,010	4.3	11,568	3.8
Other printing/writing	Oct.	136	2.3	1,581	3.6
Total packaging and other paper (s)	Oct.	415	-5.0	4,649	-5.2
Tissue	Oct.	489	0.0	5,788	2.6
Total paper	**Oct.**	**3,469**	**2.8**	**39,490**	**3.1**
Unbleached kraft paperboard	Oct.	1,754	26.0	20,212	3.0
Semichemical medium	Oct.	480	1.7	5,668	-0.3
Bleached paperboard	Oct.	343	-9.3	4,407	-2.5
Recycled paperboard	Oct.	764	0.4	8,815	-0.4
Total paperboard	**Oct.**	**3,341**	**3.4**	**39,121**	**1.1**
Total U.S. paper and paperboard output	**Oct.**	**6,810**	**3.1**	**78,611**	**2.1**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Sept.	5,200	2.7	63,129	1.4
Market pulp production	Sept.	735	3.2	8,908	0.6
Wastepaper consumption at paper/board mills	Sept.	1,817	8.9	21,273	6.6
Pulpwood consumption (cords)	Sept.	843	-89.7	99,280	0.6
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft^2)	Oct.	30.526	5.3	269.437[6]	1.7
Containerboard inventories at U.S. box plants and mills	Oct. 1	2,570	-2.8		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Sept.	988	-6.9	13,000	1.7
Imports of Canadian newsprint	Sept.	579	-11.2	8,238[6]	-0.6
U.S. paper exports (including products)	Sept.	580	10.5	8,854	8.8
Exports of unbleached kraft linerboard	Sept.	214	28.1	2,681	20.9
Exports of woodpulp	Sept.	526	-4.0	6,000	-6.2
Norscan pulp inventories[4]	Oct. 31	1,467	38.5		
Norscan pulp operating rates[4]	Oct.	88%	76%	84%	87%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Oct.	710	-16.7	7,647[6]	-4.1
Operating rates	Oct.	80%	98%	91%	96%
Inventories held by U.S. consumers	Oct. 31	1,275	1.0		
Other paper/board shipments	Oct.	682	9.3	6,232	7.6
Woodpulp shipments (export only)	Oct.	705	3.2	6,336	-9.0
Operating rates	Oct.	82%	90%	84%	94%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Kraft linerboard: Strong export demand should help keep market in balance

Grade structure: Unbleached kraft linerboard is made in a wide range of basis weights. Standard weight in the U.S. is 42 lb/1,000 ft², but other important weights are 26 lb, 33 lb, 69 lb, and 90 lb/1,000 ft². Major end use is in domestic corrugated container production, although about 13% of output is exported.

Regular unbleached accounts for the bulk of U.S. linerboard production, but mottled white, wet strength, high-performance, and other specialty grades have been showing the fastest growth. Tube, can, drum, and miscellaneous grades (520,000 tpy capacity) are included in these statistics. However, recycled linerboard (500,000 tpy) and solid bleached linerboard (190,000 tpy) are excluded.

Production: The U.S. linerboard market has been relatively stable since early last summer thanks to continuing modest growth in domestic corrugated box cutup through October and strong export shipments. U.S. corrugated box shipments were running about 0.8% ahead of a year ago through the first ten months of 1990, according to Fibre Box Assn. data. U.S. linerboard production for export was running more than 12% ahead of last year thanks to the weak dollar and stronger economic growth in Europe and Asia.

The relatively favorable market conditions have kept linerboard mills running at close to 95% of capacity while inventories were at a relatively low level of 2.558 million tons, or 4.9 weeks of supply, at the end of September. Producers were emboldened to announce a price increase of about $30/ton for Oct. 1, which would have returned the list price for linerboard in the eastern U.S. to $410/short ton. The increase was unsuccessful, mainly due to increasing economic uncertainty late last year.

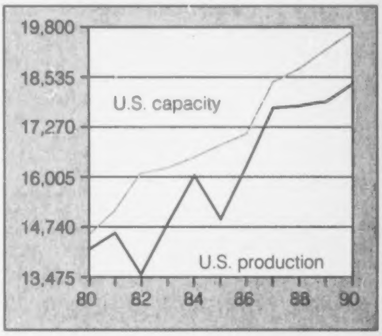
Future outlook: Most economic forecasters think the U.S. economy probably sank into a mild recession (or was at least skirting one) in fourth-quarter 1990. If this is true, corrugated box shipments will probably show a flat to slightly lower performance through at least first- and possibly second-quarter 1991. Then box shipments are expected to rebound in second-half 1991 with a recovery in the U.S. economy. U.S. box shipments for all of 1991 are expected to grow about 1.4%, just about matching industrial production. Domestic linerboard demand, however, may grow about 1.7% due to inventory building by converters from current low levels. Linerboard export shipments are expected to increase about 7% with the weak dollar more than offsetting slower overseas economic growth. As a result, total U.S. linerboard production is expected to increase 2.4% in 1991 to 19.3 million tons from 18.8 million tons in 1990. This should enable linerboard mills to run at about 91.6% of capacity in 1991, down from about 92.8% in 1990 and about 95% in 1988. The first half of 1991 will be the most difficult, with the downturn in the economy and new capacity entering the market from three new machines.

New capacity: Gaylord Container Corp. started up a 357,000-tpy machine at its Bogalusa, La., mill last July. In addition, Mead Corp. plans to produce some linerboard on the 375,000-tpy coated kraft board machine at its Mahrt, Ala., mill, which began production in September. And Union Camp Corp. will be adding about 235,000 net tpy with the startup of a new machine at its Savannah, Ga., mill in first-quarter 1991. While kraft liner capacity expansion will drop off in 1992, recycled will begin to pick up.

Prices: The last successful linerboard price increase to $410/short ton took place in spring 1988. Transaction prices began to erode in second-half 1989 after an unsuccessful attempt to push through a price increase in spring 1989. Transaction prices through the second half of 1990 have remained relatively stable, around $360 to $370 in the eastern U.S. Even though there may be some further slight erosion in transaction prices, the weak dollar should provide some support for domestic prices.

Historical year-end transaction prices for 42-lb linerboard delivered in the eastern U.S. (before zoned rebates) were as follows: 1990, $360/$370; 1989, $390/$400; 1988, $410; 1987, $380; 1986, $320; 1985, $260.

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

	1989	1990e	1991e
Production[1]	18,364	18,847	19,305
Capacity[1,2]	19,716	20,302	21,064
Utilization rate	93.1%	92.8%	91.7%
Imports[3]	120	130	140
Exports[1]	2,223	2,512	2,690
Apparent U.S. consumption	16,261	16,465	16,755
lb/capita	130.7	131.0	132.0
GNP ratio[4]	3.95	3.97	4.01

e = estimate.

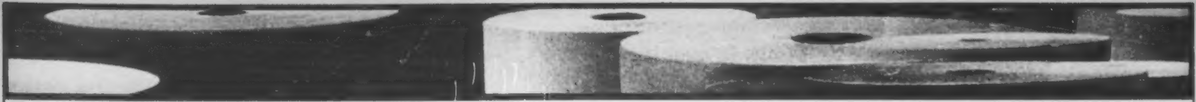
1. Includes tube, can, and miscellaneous but excludes clay coated boxboard. 2. Based on 1989 API capacity survey. 3. Dept. of Commerce. 4. 000 tons/billion $ of real GNP.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity	Market share (%)
1. Stone Container	2,890[1]	14.0
2. Georgia-Pacific	2,290[2]	11.3
3. International Paper	1,820	8.9
4. Jefferson Smurfit/CCA	1,560	7.7
5. Weyerhaeuser	1,555	7.6
6. Temple-Inland	1,445[3]	7.1
7. Union Camp	1,375[4]	6.8
8. Packaging Corp.	1,185[2]	5.8
9. Gaylord Container	1,050[5]	5.2
10. Willamette Industries	780	3.8

Market share of top five companies:
49.7%
Market share of top ten companies:
78.4%
Total U.S. capacity (kraft and recycled, 1990):
20.339 million tons

1. Includes all of 60%-owned Seminole Kraft Corp. (350,000 tpy) but excludes Canadian operations (216,000 tpy). 2. Excludes Valdosta, Ga., mill (395,000 tpy) to be sold to PCA/GE Capital by end of 1990. 3. Includes 210,000-tpy recycled liner mill in Ontario, Calif. 4. Does not reflect 235,000-tpy net addition to capacity from new 460,000-tpy linerboard machine expected to begin production in early 1991. 5. Includes total capacity of new 357,000-tpy machine that started up at Bogalusa, La., mill in July 1990.



ISSUE FOCUS: OUTLOOK 1991

U.S. Paper Industry Will Manage Economic Slowdown This Year

Operating rates and earnings will decline, but U.S. papermakers will remain competitive

The U.S. paper industry is prepared for the economic slowdown that began in fourth-quarter 1990 and is expected to continue in first-quarter 1991. Paper company executives and financial analysts surveyed by *Pulp & Paper* expect a mild recession at the beginning of this year with a recovery in the second half of the year. Most analysts expect demand for the industry's products to remain weak until the U.S. economy recovers later this year, but exports should offset some of the decline in domestic demand. This will result in a production gain of only 1% for paper products and almost no growth for paperboard packaging grades.

Unfortunately, production capacity will expand by 3.8%, or 3.2 million tons, this year as a result of the industry's huge capital spending program during 1989-91. The three-year boom in capital spending peaked in 1990 at $18 billion, but capacity expansions will not peak until this year. Paper companies plan to spend an estimated $17 billion this year, although this figure may be revised downward as companies postpone or stretch out capital projects as the year goes on. Without these revisions, however, more capacity will be added this year than any year since 1973, and operating rates are forecast to decline to 90.6% for paper grades and 90.2% for paperboard.

Compounding overcapacity problems are industry forecasts of higher costs and declining earnings. Analyst Tom Clephane of Morgan Stanley predicts, "The paper industry will not be able to raise prices because of the 1991 recession and the capacity bulge in a number of grades. We are estimating that the industry's costs will be up 5% this year and profits for an average commodity paper producer will be down 20% to 25% in 1991 following a 25% decline in 1990."

FALLING PRICES. Lawrence Ross of Paine Webber thinks the industry will not be able to maintain even the current price structure, and he expects prices to deteriorate across-the-board. "We expect to see some year-over-year recovery in newsprint prices and generally

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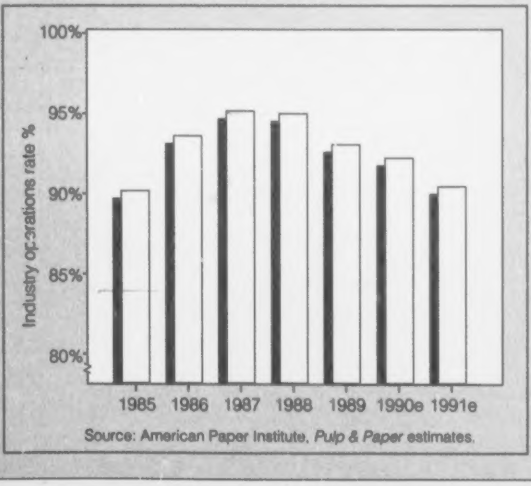
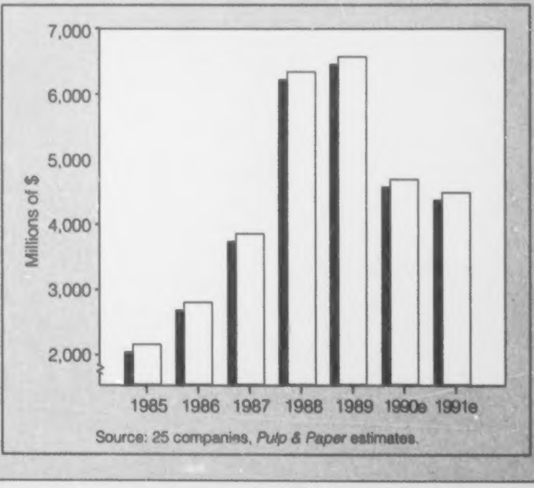
Outlook 1991 was prepared by Pulp & Paper *news editors Will Mies, Debra Garcia, Noel DeKing, Robert Galin, Sophie Wilkinson, and Jim McLaren.*

Operating rates are falling at U.S. paper and board mills...



Source: American Paper Institute, *Pulp & Paper* estimates.

...and profits are suffering



Source: 25 companies, *Pulp & Paper* estimates.

flat year-to-year tissue prices but renewed price weakness in uncoated free-sheet and continuing price weakness in coated paper grades and market pulp." Ross predicts that coated paper will have the lowest operating rates in the industry but not necessarily the weakest price structure.

The level of operating rates forecast by most analysts will prevent any price increases this year, with perhaps the exception of tissue and newsprint.

Sherman Chao of Salomon Brothers expects only tissue to report operating rates of 93% or better, the level which generally defines a buyer's market from a seller's market. Newsprint operating rates are likely to average about 90%, but that figure is dependent on the outcome of Canadian labor negotiations. Among the remaining major commodity grades, Chao predicts that bleached board operating rates will average 92% and uncoated free-sheet rates will average 91%, just above the rate needed to maintain stable markets. The weakest operating rates will be coated paper at 88% and linerboard at 89%.

Chao believes that the current downturn may mean greater demand declines for printing/writing paper than for linerboard and packaging grades. This reflects the fact that the service sector now accounts for a larger share of the U.S. economy than the industrial sector.

HIGHER COSTS. Many of the industry's major capital projects are aimed at improving productivity and reducing costs, but most companies will be paying higher prices for raw materials, energy, and labor this year. Prices for woodchips are likely to remain near record levels because of softening markets for wood products and tight timber supplies in the Pacific Northwest. Evadna Lynn, forest products analyst at Dean Witter Reynolds, thinks woodchip costs will continue to rise because of a further decline in wood products output, and fuel and freight costs could rise sharply if the Persian Gulf conflict is not resolved.

The U.S. paper industry has substantially reduced its purchases of fuel oil and natural gas, which should reduce the cost impact of inflated oil prices resulting from the Gulf conflict. Purchased fuel oil accounted for less than 8% of the industry's total energy supply last year, down from 22% in 1972 when more than twice the amount of oil was used. In New England, however, oil provides 36% of the energy used by the pulp and paper industry. In total, the industry relied on purchased fuel and energy for 42.3% of its power supply in 1989. Self-generated and residue sources of energy provide 56.4% of the power supply.

Mark Diverio of Shearson Lehman Brothers says the oil shocks of the 1970s led to a round of capital spending on new recovery and power boilers that improved energy efficiency and increased paper mills' capabilities to use alternative fuels. For example, many mills can alter

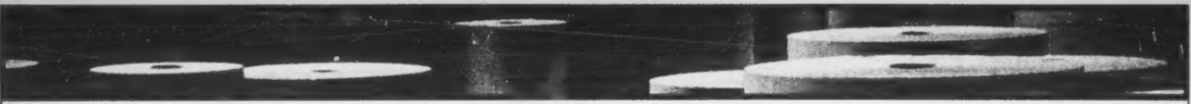
TABLE 1: **Analysts' projections for 1991 (percentage change from 1990 levels).**

	Growth in real GNP	Production		Operating rates[1]		Prices		Unit costs[2]	Earnings		Housing starts[3]
		Paper	Board	Paper	Board	Paper	Board		Paper	Forest	
Tom Clephane **Joanne Carroll** Morgan Stanley	(0.1)	1.9	1.0	91.7	92.2	1.5	(1.1)	5.0	(20)	(25)	1.05
George Adler Smith Barney	(0.3)	2.0	0.2	91.2	89.8	(3.0)	(4.0)	4.0	(20)	(26)	1.21
Evadna Lynn Dean Witter Reynolds	0.3	0.7	0.1	89.8	89.9	(2.0)	(2.9)	3.7	(12)	15	0.95
Mark Kurland Mabon Nugent	0.0	1.5	0.0	92.0	90.0	(5.0)	(3.0)	3.0	(30)	(40)	1.10
Lawrence Ross Paine Webber	(0.2)	(1.0)	(1.0)	89.0	88.0	(3.0)	(4.5)	4.5	(20)	(50)	n.a.
Thomas Farrell Deutsche Bank	(0.3)	(2.0)	(2.0)	89.0	90.0	(2.0)	(7.0)	4.0	(25)	(50)	1.10
William Wigder First Boston	(0.2)	3.4	2.1	93.0	91.6	(2.0)	5.5	3.0	(20)	(15)	1.05
Sherman Chao Salomon Brothers	(0.9)	(0.6)	(0.9)	89.5	89.0	(6.0)	(10.0)	5.0	(25)	(20)	1.10
Gary Palmero Oppenheimer & Co.	0.8	1.7	1.7	91.0	91.4	(1.7)	(2.6)	5.3	(13)	(9)	1.20
Mark Rogers Prudential Bache	2.0	3.1	3.7	91.8	92.0	1.9	3.8	4.4	1	2	1.35
Chad Brown Barclays de Zoete Wedd	(0.7)	(0.4)	(0.7)	88.7	89.1	(1.0)	(1.0)	1.5	(36)	(40)	1.18
Mark Diverio Shearson Lehman Brothers	(0.7)	1.5	0.5	91.0	90.5	(3.0)	(2.0)	3.5	(15)	(24)	1.03
Richard Palm Merrill Lynch	(0.2)	1.0	(1.0)	90.0	89.0	(2.0)	(2.0)	1.0	(20)	n.a.	1.11
Richard Schneider Kidder Peabody	(0.2)	1.2	(0.2)	90.6	89.9	(2.3)	(6.8)	4.3	(14)	(27)	1.05
Average	**(0.1)**	**1.0**	**0.3**	**90.6**	**90.2**	**(2.1)**	**(2.7)**	**3.7**	**(19)**	**(24)**	**1.11**

( ) represents a negative figure, n.a.=not available

1. Production as percent of capacity. 2. Costs/ton of output. 3. Millions of units.

Source: *Pulp & Paper* Survey.



their energy mix to accommodate changes in relative fuel prices. He adds, "From a corporate earnings standpoint, the slowdown in demand as a result of a recession will be much more important than the energy cost impact, although some companies are obviously more dependent on oil than others."

A FEW BRIGHT SPOTS. Despite the current cyclical downturn, the U.S. paper industry remains one of the best-positioned industries in the U.S. economy. The industry's access to relatively cheap energy and low-cost southern woodfiber remains its most enduring competitive edge over major producers in Europe, Scandinavia, and Japan, says Prudential-Bache analyst Mark Rogers. "Should the low valuation of the dollar continue, as we expect, it will provide an important benefit to the industry's ability to begin to boost profitability once paper demand begins to recover," he says.

The low value of the U.S. dollar will enable prices of key paper grades to bottom out at higher levels than in previous industry downturns in 1985 and 1980-82, according to Chad Brown of Barclays de Zoete Wedd. Thus, the cyclical earnings decline is likely to be more severe for paper companies outside the U.S. This cycle will be essential to worldwide producers of newsprint, bleached board, linerboard, and market pulp products sold internationally.

The level of U.S. exports of these products will largely be determined by economic activity outside the U.S. and the choice on the part of U.S. mills to do more exporting. While bleached board export prices should remain stable, most analysts expect export prices of market pulp to decline this year and kraft linerboard export prices to decline slightly.

NO MERGERS. The paper industry's cash flow will not be strong enough this year to support another large merger similar to the Georgia-Pacific Corp./Great Northern Nekoosa Corp. deal in 1990, say most analysts.

However, most observers expect to see the sale of individual mills and converting operations continue this year. Such transactions would be similar in scope to Georgia-Pacific's sale of mills and corrugated plants to Packaging Corp. of America, Boise Cascade Corp.'s sale of its Vancouver, Wash., mill to Appleton Papers Inc., and Federal Paper Board Co.'s sale of its folding carton plants, which all occurred last year.

TABLE 2: **Industry operating rates (%).**

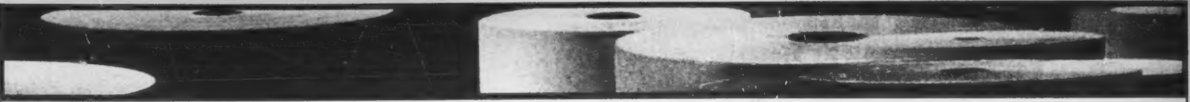
Paper	**1986**	**1987**	**1988**	**1989**	**1990e**
Newsprint	97.0%	97.3%	97.8%	96.7%	95.8%
Uncoated groundwood	91.4	90.6	95.7	93.0	90.1
Coated paper	92.9	93.1	94.0	92.0	93.2
Uncoated free-sheet	94.4	95.4	94.8	91.6	94.7
Bristols	96.6	97.5	96.2	97.3	95.0
Thin paper	79.2	82.8	85.0	87.2	83.3
Cotton paper	79.2	82.3	83.3	79.7	81.2
Packaging and industrial	88.9	90.2	93.3	90.5	85.8
Tissue	93.1	96.3	96.6	97.2	96.7
Total paper	**93.2**	**94.2**	**95.4**	**93.2**	**93.4**
Paperboard					
Kraft linerboard	95.5	98.5	95.7	94.1	95.5
Other kraft	88.9	86.5	79.5	85.1	81.0
Total	**95.0**	**97.3**	**94.4**	**93.4**	**94.3**
Semichemical	96.7	97.4	97.8	98.4	97.1
Bleached board	93.3	94.2	95.3	95.8	96.5
Recycled	89.7	92.8	92.2	91.0	87.5
Total paperboard	**93.8**	**96.2**	**94.5**	**93.8**	**93.3**
Total paper and paperboard	**93.5**	**95.1**	**94.9**	**93.4**	**93.2**

Source: American Paper Institute and *Pulp & Paper* estimates.

TABLE 3: **Industry production (000 tons).**

Paper	**1986**	**1987**	**1988**	**1989**	**1990e**
Newsprint	5,630	5,482	5,982	6,088	6,548
Uncoated groundwood	1,540	1,498	1,624	1,743	1,734
Coated paper	6,263	6,860	7,359	7,215	7,493
Uncoated free-sheet	10,410	10,966	11,277	11,081	11,507
Bristols	990	1,052	1,150	1,163	1,190
Thin paper	247	240	281	245	225
Cotton paper	152	163	169	161	164
Packaging and industrial	5,117	4,955	5,033	4,916	4,694
Tissue	5,095	5,301	5,476	5,636	5,779
Total paper	**35,444**	**36,876**	**38,351**	**38,248**	**39,334**
% change	**4.3%**	**4.0%**	**4.0%**	**−0.3%**	**2.8%**
Paperboard					
Kraft linerboard	16,402	17,683	17,897	18,056	18,727
Other kraft	1,287	1,215	1,244	1,434	1,399
Total	**17,689**	**18,898**	**19,140**	**19,490**	**20,126**
Semichemical	5,376	5,536	5,664	5,691	5,679
Bleached board	4,271	4,406	4,511	4,521	4,457
Recycled	8,083	8,601	8,789	8,754	8,776
Total paperboard	**35,419**	**37,442**	**38,105**	**38,456**	**39,038**
% change	**7.2%**	**7.2%**	**1.8%**	**0.9%**	**1.5%**
Total paper and paperboard	**70,863**	**74,318**	**76,456**	**76,704**	**78,372**
% change	**5.7%**	**4.9%**	**2.9%**	**0.3%**	**2.2%**

Source: American Paper Institute, *Pulp & Paper* estimates.



In 1990, the sale of corrugated container plants accounted for the greatest number of transactions in the industry.

The only feasible transactions are strategic acquisitions that have value to both buyer and seller, says Chao of Salomon Brothers. For example, companies having a weak balance sheet may be forced to sell noncore businesses to financially strong companies seeking growth. However, capital available to fund acquisitions is scarce as both cash flow and financial markets have declined during the past year. Additionally, the weak pricing outlook for the industry has discouraged financing for some deals. Last year, both Media General and Kimberly-Clark Corp. were unable to sell newsprint mills because potential buyers failed to secure sufficient financing.

NO DIVIDEND CUTS. Despite the moderately pessimistic outlook for the industry this year, most analysts do not expect paper companies to significantly reduce their stock dividends, which generally represent 10% to 15% of cash flow. A few highly indebted companies could face a critical financial squeeze if the economic downturn this year is deeper or longer than predicted and their creditors could force a dividend cut, says Lynn of Dean Witter Reynolds. But generally, she does not foresee a widespread reduction in dividends.

Chao of Salomon Brothers expects only three paper companies not to earn their dividend this year, but only two of these companies face the real prospect of having to cut their dividend. This contrasts with the 1980-82 recession during which eight companies cut their dividends. He foresees few companies facing this grim scenario during this cyclical downturn because companies resisted the temptation to raise dividends too aggressively when earnings were at record highs. He comments that five of the eight companies that cut dividends during the 1980-82 recession—Crown Zellerbach, Diamond International, Pacific Lumber, Southwest Forest Industries, and St. Regis—are no longer independent companies. As far as investing in paper company stocks, most analysts advise caution and are not recommending the stocks to their clients.

Uncoated free-sheet

Uncoated free-sheet still lively

■ Nearly 1 million tons of new capacity and an economic downturn are likely to adversely affect the uncoated free-sheet paper markets, though analysts say that many mills will still make money.

Resource Information Systems Inc. vice president John Maine estimates that uncoated free-sheet mills will experience lower operating rates because of increased capacity, but mills should still remain at utilization rates of 90% or above for the next five years, Maine said. Paper demand will advance about 2.9% this year, compared with a GNP of less than 1%.

Analysts at Morgan Stanley & Co. agree, predicting that operating rates will average 92.2% this year, slightly down from the estimated 93.4% of 1990 but still somewhat healthy. At the same time, capacity is increasing 5%, according to the American Paper Institute. Morgan Stanley suggests that consumption will rise slightly more than 3% and prices by 3.5% this year compared with 1990, when prices actually declined an estimated 1.8%.

New capacity onstream by the end of 1991 will include the following: Boise Cascade Corp., 300,000 tpy, International Falls, Minn. (late 1990); Willamette Industries Inc., 255,000 tpy, Bennettsville, S.C. (September/October 1990); Georgia-Pacific Corp., 325,000 tpy, Ashdown, Ark.; and Union Camp Corp., 240,000 tpy, Eastover, S.C. (1991). Federal Paper Board Co. is considering its first uncoated free-sheet printing/writing paper machine for Augusta, Ga.

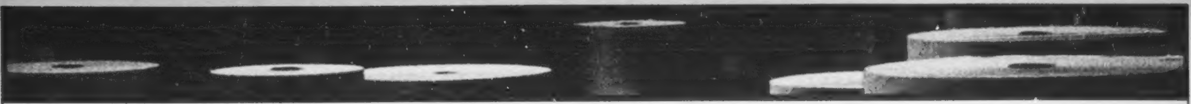
Because the recycling issue isn't going to go away, many mills in 1990 introduced recycled uncoated free-sheet grades. However, mills will have to deal with governments trying to develop stricter guidelines for definitions of recycled paper, meaning that some will consider installing their own deinking plants. Also, the number of mills converting to alkaline-based paper continues to grow, with some 43 mills now producing it. The lower costs and potential increased marketability to some end uses may help offset some of the fears in this recession year.

CUT-SHEET GROWTH CONTINUES. High growth in cut-sheet paper used in computer printers will help raise demand by about 6.5% annually through 1994, according to BIS CAP International. Cut-sheet demand in the U.S. will post a compound annual growth rate of 6%/year, while in Canada the rate will be 7% in the 1989-94 period. International Business Forms Assn. forecasts stock continuous forms to continue to be the strongest growth area of the major forms products, with 3.4% real average annual growth in sales from 1990 to 1991.

BIS CAP said that total cut-sheet paper for printers, copiers, typewriters, and duplicators will rise from almost 3.2 million tons in 1989 to 4.3 million tons in 1994. About 53% of that tonnage will be used in copiers, with about 41% for computer printers.

Growth in cut-sheet paper for computer printers will advance 16%/year, and 4% for copiers. Cut-sheets used in typewriters and duplicators will decline substantially over the five-year period.

Basepaper for thermal and other specialty uses related to electronic data transmission and printouts will perform much better than both cut-sheet and forms markets, according to BIS CAP. For instance, demand for thermal paper in the U.S. will rise from almost 33,000 tons in 1984 to 107,000 tons in 1994—a 27% compound annual growth rate.



Coated paper

Coated mills to post few gains

■ Addition of 800,000 short tons of new coated free-sheet paper capacity, the recession, and the tightening of credit could all hurt coated paper producers this year, though product prices are not expected to decline as much as they did in 1990.

Even so, Morgan Stanley & Co. estimates that operating rates for coated mills will nudge up to 90.6%, after being under 90% for two years. This is based on a capacity increase of 4.8% over last year. However, actual profits will fall, perhaps 23.5% after a loss of 38.4% in 1990, Morgan Stanley predicted. Overall demand growth for coated paper will average 4% to 5% this year, according to forecasts by Resource Information Systems Inc. That forecast is still optimistic, considering the recession. But RISI vice president John Maine forecasts operating rates at 87%. Jaakko Pöyry Consulting projects the following operating rates: U.S. coated free-sheet mills, 86.6%; Canadian coated free-sheet, 88.4%; U.S. coated groundwood, 95.3%; and Canadian coated groundwood, 95.6%.

Jaakko Pöyry foresees Canadian domestic consumption of coated free-sheet paper rising just 2% in 1991 from 1990, while U.S. consumption will advance almost 9%, to just under 4 million tons. Canadian coated groundwood consumption could increase upwards of 9%, and U.S. customers will consume slightly less than 6% more, according to Jaakko Pöyry figures.

Maine said the strongest growth will be in advertising inserts and other commercial printing, followed by catalogs and magazines. The most energetic demand will be for the higher grades, Nos. 1 through 3, where much of the new capacity is focused.

Growth in coated imports will slow this and next year because of the economic situation, because there is no new announced coated capacity in Canada, and because new U.S. coated free-sheet capacity will be available, Maine said. New capacity this year will include a 125,000-tpy conversion at Westvaco Corp.'s Wickliffe, Ky., mill and Consolidated Papers Inc.'s 212,000-tpy coated free-sheet machine at Wisconsin Rapids, Wis. The only current coated groundwood project is that of Boise Cascade Corp. at Rumford, Maine. However, that 308,000-tpy project has been delayed until 1994.

Jaakko Pöyry's Dan Temple said that with the continued delay in new North American coated groundwood capacity and increasing coated groundwood capacity in Europe, U.S. imports of coated groundwood paper from Europe are likely to rise above current projections, which were expected to remain flat this year at 350,000 short tons from non-Canadian sources. Canadian exports of coated groundwood grades to the U.S. may rise slightly less than 7%. Coated free-sheet imports are expected to rise just under 6% from all sources.

Coated papermakers are closely watching the retail/catalog and publishing sectors, which are likely to continue turning downward as the recession continues.

For example, magazine advertising pages for the nine-month period from January through September 1989 were off 3.3% compared with 1989, according to the Publishers Information Bureau. Brian Vergin, senior vice president of marketing for Blandin Paper Co., a producer of coated groundwood grades, told a company publication that he believes "a good number of magazines will disappear." Most major magazines have suffered circulation declines, and both Canadian and U.S. publishers face postal rate increases this year. General overcapacity and high publisher inventories exist.

The good news so far is that paper list prices have not fallen, but there are discounts. Morgan Stanley expects coated paper prices to rise 0.5% this year, compared with an average price decline of 2.9% in 1990.

Tissue

New capacity braves slower growth in demand

■ Slower economic growth will hold down gains in demand for both consumer and commercial and industrial (C&I) tissue in 1991. Demand is expected to grow at roughly 1% this year, the slowest gain since 1985, and mills will operate at rates around 94% to 95%. The weakening economy could reshape demand, driving consumers to use lower-price tissue, hurting up-scale producers. Private-label products also do better under these conditions. And people eat out less in an economic dip, damping the demand for C&I tissue.

On the whole, both the consumer market and the C&I business are quite stable now. Tissue firms realized a 3% or so price hike on consumer tissue by mid-1990, though the introduction of Kimberly-Clark Corp.'s Kleenex bath tissue late in the summer led to some promotional activity in the South. The industry's 5% across-the-board price hike in away-from-home tissue planned for late fall was moving into place toward year end and will probably result in a 3% rise. In 1991, analysts expect overall tissue prices will go up 2% to 3%, including some carryover from last year's hikes and a possible rise in second-half 1991.

NEW CAPACITY AHEAD. The tissue industry is planning a flurry of new projects, though some analysts believe a few of the announcements are simply posturing by the industry. Among the potential projects is a new $200-million mill being planned by Scott Paper Co. on the Ohio River in Indiana or Kentucky. Along with some other investments, this project should release the firm from the need to buy tissue paper. Construction should begin in 1991.

Fort Howard expects a mid-1991 startup for a fourth tissue machine at its Savannah River mill in Rincon, Ga., raising the mill's 100%-recycled tissue capacity 30%, or 225 tpd. Output will find its way primarily to

the C&I market. Potlatch Corp., which claims the premier position in private label and generic tissue products in the U.S., plans to start up a new tissue machine and shut down an old one at its Lewiston, Idaho mill by 1992. The $95-million effort will bring mill capacity to 124,300 tpy, up from 85,700 tpy.

Kimberly-Clark introduced its first baby wipes product in California in fall 1990. Baby wipes comprise a $350-million market at the retail level in the U.S., according to a K-C spokeswoman, and the sector is growing 5% to 10%/year.

The firm also put up a C&I tissue mill in Loudon, Tenn., that reportedly went online in August 1990. And the firm's new Jenks, Okla., facility is being dedicated to K-C's reentry into the U.S. consumer bath tissue market. The plant started up in April that year and has capacity for 68,000 metric tpy of consumer tissue. The 100%-virgin fiber tissue was initially being sold in the southern and central U.S.

Competitors did not sit back quietly, however. For example, Procter & Gamble Co. reportedly responded with a very aggressive price on its own bath tissue. And P&G is continuing its expansion in the consumer toilet tissue and paper towel market. It plans to pump about $250 million into two new paper machines at an existing P&G plant east of the Rockies. Engineering studies for the project should be complete by the end of 1991. The firm is also planning a $100-million tissue and towel expansion that could include a new machine in California, possibly in Oxnard.

TABLE 4: **North American tissue expansions.**

Startup date	Company	Site	Annual capacity (short tpy)
1989	Vicell Canada Tissue Ltd.	Delta, B.C.	9,900
1989	FSC Paper Co.	Alsip, Ill.	70,000
1989	Atlas Tissue Mills	Hialeah, Fla.	15,000
1989	Irving Tissue Co.	St. John, N.B.	60,000
1989	Fort Howard Corp.	Rincon, Ga.	91,000
1990	Atlantic Packaging Products Ltd.	Whitby, Ont.	30,000
1990	Kimberly-Clark Corp.	Loudon, Tenn.	n.a.
1990	Kimberly-Clark Corp.	Jenks, Okla.	75,000
1990	Cascades Inc.	Kingsey Falls, Que.	28,000
1990	Wisconsin Tissue Mills	Menasha, Wis.	80,000
1990	Putney Paper Co., Inc.	Putney, Vt.	5,000[1]
1990	Procter & Gamble Paper Products Co.	Green Bay, Wis.	n.a.
1991	Perkins Papers Ltd.	Candiac, Que.	28,000
1991	Fort Howard Corp.	Rincon, Ga.	91,000
1991	Consumers Paper & Supply Corp.	Calgary, Alta.	28,000
1992	Potlatch Corp.	Lewiston, Idaho	39,000[2]
n.a.	Scott Paper Co.	n.a.	n.a.[3]
n.a.	Procter & Gamble Paper Products Co.	n.a.	n.a.[4]
n.a.	Mosinee Paper Corp.	Middletown, Ohio	n.a.[5]
n.a.	James River Corp.	Old Town, Maine	n.a.
n.a.	James River Corp.	Naheola, Ala.	n.a.

n.a.—not available.

1. Estimated capacity addition from rebuild.
2. Net capacity addition.
3. Scott Paper approved an expansion, including a $200-million greenfield mill and rebuild of an idle machine.
4. Procter & Gamble plans an expansion valued in excess of $100 million, including at least one new machine in California; $250 million will also be invested in two new machines at an existing mill east of the Rockies.
5. Mosinee Paper is putting $50 million into a new tissue operation.

Source: *Pulp & Paper.*

Containerboard

Strong exports will help market

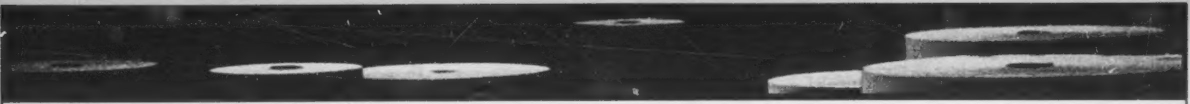
■ U.S. linerboard producers were unsuccessful in pushing through a $30/ton price increase to $410 in the eastern U.S. last October even though market conditions were relatively favorable. Linerboard and even semichemical medium mills were generally running full, and containerboard inventories remained at low levels due to continuing modest growth in domestic corrugated box cutup combined with surging linerboard export shipments. U.S. linerboard exports were expected to be up about 16% in 1990 to nearly 2.9 million short tons, surpassing the previous record of 2.5 million tons set in 1980 (based on Dept. of Commerce data).

But now analysts are wondering whether the industry can simply hold linerboard transaction prices at around their current $360 to $370/ton level if the economy—and corrugated box demand—begin to weaken, particularly with the market in the seasonally slow winter period. One bright spot continues to be U.S. linerboard exports, which are expected to remain strong due to the weak dollar even with slower economic growth in Western Europe and Asia. The strength in exports is expected to help prevent a collapse in prices and profits such as experienced by the industry in 1985.

"U.S. containerboard producers will be saddled with slack market conditions through the summer of 1991," Rodney Young, president of Resource Information Systems Inc., told last November's 4th International Unbleached Kraft Conference in New Orleans, La. He said U.S. corrugated box shipments were likely to show a flat performance at best during the first half of 1991 if the U.S. economy drops into a mild recession.

At the same time, substantial new linerboard capacity will be entering the market from three new machines. Gaylord Container Corp. started up a 357,000-tpy machine at its Bogalusa, La., mill last June, while Mead Corp. will be producing some linerboard from its new 375,000-tpy coated kraft board machine at Mahrt, Ala., which began production last September. Union Camp will be adding about 235,000 net tpy of capacity with the startup of a new machine at its Savannah, Ga., mill in the first quarter of this year.

This additional capacity will cause U.S. linerboard mill operating rates to drop to average 91% in the first half of 1991, the lowest point of the current cycle, according to Young. He believes, however, that U.S. linerboard producers will be able to start restoring profit margins in second-half 1991. "A cyclical upturn in the



Columbia and then a revival of world economic growth in the second half of the year. Any prolonged labor disruption in British Columbia, which accounts for about 15% of total world supply, would probably result in a temporary lift for the market. Yet most analysts expect the pulp market to remain under pressure over the next several years due to substantial new capacity additions. World paper pulp capacity is expected to rise at about a 4%/year rate over the next several years, with the biggest bulge of 1.9 million tons coming in 1991.

Among major new bleached kraft pulp projects coming onstream in North America have been Weyerhaeuser Paper Co.'s new 425,000-tpy mill at Columbus, Miss., and Daishowa Canada Co. Ltd.'s new 350,000-tpy mill at Peace River, Alta., both of which started up last year. And three new bleached chemi-thermomechanical pulp mills will be starting up in Canada in late 1990 or early 1991 with a combined capacity of about 450,000 tpy. The heaviest expansion activity this year will shift to Latin America, where Aracruz Celulose SA will be starting up the 525,000-tpy addition to its Brazilian mill in the first quarter. And Cellulose Santa Fe (Scott Paper and Shell) will be starting up a 240,000-tpy eucalyptus mill in Chile.

Rodney Young, president of RISI, expects the pulp market to "record a solid three-year upswing beginning in 1991 due to a cyclical reacceleration of the world economy." Pulp demand will be helped by above-average growth in printing/writing and tissue paper. However, he believes demand will be inhibited by potentially high prices for northern softwood, integrated pulp capacity expansion, and rising wastepaper usage.

Nevertheless, the upswing in pulp demand is "not expected to result in return to very tight market conditions in the first half of the 1990s due to the large announced capacity expansion round." He projects operating rates for world paper-grade market pulp rising from 86% in 1990 to 87% in 1991 and then to 92% by 1993. He believes the next peak in industry profit margins will be 20% to 30% below the 1989 peak, with a significant differential in profitability between softwood and hardwood pulp.

How far will prices fall? "Over the last four downcycles, prices have fallen until they were about $10/ton below the variable manufacturing cost of the portion of production needing to be curtailed in order to balance supply and demand," noted Allen Whitman of Whitman Associates in a recent issue of *PaperTree Letter*. Therefore, prices would probably bottom close to $600 for northern softwood and the low- to mid-$400 range for hardwood, based on several estimates of industry costs and taking into account more recent decline in the dollar. "Some producers will make a little money at these prices," he said. "Most will not."

"The 1990s will be one of the most rapidly changing decades in the market pulp business," according to Kenneth Lowe in a recently completed *Pulp & Paper Forecaster* study, "Market Pulp in the Competitive '90s."

Labor

Quiet in the U.S., tumult in Canada

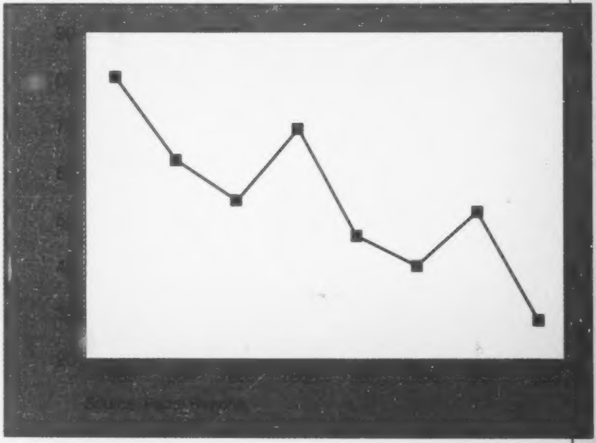
■ In 1989, Stone Container Corp. CEO Roger Stone warned Canadians that free trade between the U.S. and Canada would reveal some of the cost excesses of Canada's paper industry, most noticeably, its higher labor costs and lower productivity. Stone said that to become more competitive, Canadian paperworkers would need to start accepting wage and benefit increases commensurate with those in the U.S. In a showdown last year between the CPU and Stone's Montreal, Que., subsidiary, Stone-Consolidated Inc., however, Canadian workers walked away with an annual wage hike of 5.5%, significantly above the average for members of the United Paperworkers International Union (UPIU) and the Assn. of Western Pulp & Paper Workers (AWPPW) in the U.S.

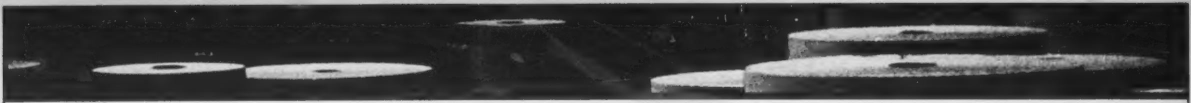
Negotiations last year in both countries further pointed out the differences between U.S. and Canadian labor. Relative peace in U.S. contract negotiations came at the expense of continued concessions to company cost-cutting measures, while strikes raged through the summer and fall throughout eastern Canada as workers opposed controversial contract provisions.

Looking ahead to 1991, it appears that workers in Canada's western industry are geared to fight for similar wage and vacation pay hikes that were achieved by eastern workers last year, while U.S. workers struggle to oppose continued management demands for moderate wage hikes, the elimination of premium pay, and cutbacks in health coverages.

Contract negotiations involving about 80 U.S. pulp and paper industry locations are scheduled to come up during 1991, and companies are expected to continue to pursue cost-containment measures, especially in health care coverages. Health insurance expenses have been rising almost double the general rate of inflation. Aver-

FIGURE 5: **Strikes continue to decline as a bargaining tool.**





age annual health plan costs per employee come to about $2,350, and this will lead paper companies to put the control of health insurance costs at the top of their bargaining agenda in the coming year. Other trends that are expected to continue from last year are the declining use of lump-sum payments in substitution of a first-year wage increase and a dramatic increase in four- and five-year contracts.

The number of strikes in the U.S. pulp and paper industry continues to decline, with three occurring last year and one strike in 1989, compared with 19 in 1983 and 16 in 1986. While several mills remain under implemented contract provisions in the absence of a ratified agreement, 1990 appeared to be a generally conciliatory year in the U.S., with long-term contracts reached at several major facilities. The threat of striking workers being permanently replaced by temporary employees continues to loom over the unions, especially since the International Paper Co. strikes of 1988; but in over 115 strikes since 1980, only a handful of mills have actually replaced their union work forces. Unions seem limited by the ability of a company to operate its mill using salaried personnel, which occurred in two U.S. strikes last year.

LUMP-SUM PAYMENTS DECLINE. The elimination of Sunday premium pay for paper workers continued through 1989 and 1990, with over 100 mills having cut the policy by the middle of last year. AWPPW said it has yet to ratify a contract that eliminates Sunday premium pay, although union members are working under implemented contracts that contain the provision. While market pressure increases on other mills to follow suit, companies that have already eliminated Sunday premium are now attempting to cut costs by redesigning work practices and job descriptions.

The lump-sum practice was beneficial for companies both in maintaining a lower base wage and in reducing the multiplied effect on benefits and pensions in any one year. At some facilities, a general wage increase was replaced by a percentage increase based on W-2 earnings. Some mills were able to eliminate holidays and shift differentials. On the surface, average first-year wage increases went up in 1990 to 2.4% compared with 1.1% in 1989, but the low 1989 figure was due to the proliferation of lump-sum payments, which sometimes amounted to 3% of annual wages, noted industry labor consultant Julian Kien.

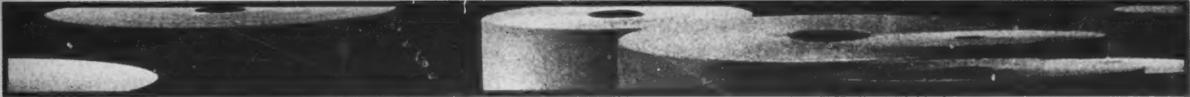
"In the last year, we held our own," said a UPIU executive. "The gains were not what we would consider to be fair, but it was an improvement." He emphasized improved attitudes among certain companies, namely Scott Paper Co. and James River Corp., two major producers who established high-level labor management committees with UPIU.

"We've developed a working relationship with them, and it is reflected at the bargaining table," the UPIU executive said. Companies such as International Paper Co. and Georgia-Pacific Corp., however, still draw the ire of union officials. "Unfortunately, things haven't improved

TABLE 5: **Canadian Paperworkers Union strikes, 1990.**

Company/mill	Grade	Capacity (metric tpy)	CPU Local No.	Number of workers	Dates of strike
James Maclaren Industries Inc.					
Masson, Que.	Newsprint	200,000	11	420	7/26-8/27
Quebec & Ontario Paper Co.					
Baie Comeau, Que.	Newsprint	450,000	352/375	1,200	7/28-8/27
Thorold, Ont.	Recycled News	310,000	35/41/101	530	8/14-12/18
Abitibi-Price Inc.[2]					
Thunder Bay Div.[3]	Newsprint	161,000	132/134/249	515	9/10-10/9
Fort William Div.[3]	Newsprint	141,000	—	—	9/10-10/9
Provincial Papers[3]	Coated	170,000	40/239	750	9/10-10/9
Iroquois Falls, Ont.	Newsprint	263,000	90/109	690	9/10-10/9
Chandler, Que.	Newsprint	208,000	162/858/455	530	9/10-10/9
Stephenville, Nfld.	Newsprint	166,000	1093	260	9/10-10/9
Grand Falls, Nfld.	Newsprint	196,000	59/63/88 158/161	740	9/10-10/9
Canadian Pacific Forest Products Ltd.					
Gatineau, Que.	Newsprint	525,000	142/251	1,255	9/12-
Dalhousie, N.B.	Newsprint	302,000	146/164/263	835	9/12-
Thunder Bay, Ont.	Newsprint	400,000	39/257	1,760	10/11-
	Kraft pulp	454,000	—		
Repap Enterprises Corp.					
Newcastle, N.B.	Coated	300,000	689	850	11/24-11/30
	Kraft pulp	60,000	—	—	
Irving Pulp & Paper Ltd.[4]					
Irving Tissue/St. John, N.B.	Tissue	67,500[5]	786	105	3/29-5/25
Rothesay Paper/St. John, N.B.[6]	Newsprint	322,000	601	450	4/9-

1. Strikes through Dec. 15, 1990.
2. Company laid off nearly 1,000 woodworkers following strikes.
3. Located in Thunder Bay, Ont.
4. Strikes not related to CPU pattern negotiations.
5. Includes new 150-tpd tissue machine, started up November 1989.
6. Company operated one of two machines (450-tpd) following strike.



one iota with IP," the union leader said. "And G-P and Stone Container are still in the same position. There are no realistic proposals."

ATTEMPTS TO REGAIN POWER. Although pooling does not have a successful history in the U.S. paper industry, UPIU employed this tactic again during its 1989-90 bargaining involving 6,000 workers of Champion International Corp. at seven locations. In early 1990, UPIU established a pool among 25 locals of International Paper, saying it expected the IP pool to grow to 100 locals by late-1991. In addition, AWPPW has several multi-mill "units" in the Northwest. But the National Labor Relations Board has consistently ruled against attempts at coordinated bargaining so far.

Average first-year wage increases of 2.4% in the U.S. continue to be below the 3.0% average of the U.S. manufacturing sector and well below annual wage hikes of 5.5% achieved by Canadian industry workers. Analyst Kien noted that labor agreements in the U.S. are becoming longer, with 60% of pacts in the first nine months of 1990 being for four or more years. In 1987, 10% of contracts were for four years or more. Of the 62 mills that settled through October 1990, one-third did so for five or more years. The long-term impact of contract extensions will be moderation in wage escalation as those increases in 1992 through 1994 continue at established levels and the accords create a stable work environment in the face of the industry's cyclical downturn, Kien said.

CANADA WRACKED WITH UNREST. With the Canadian paper industry already reeling from poor markets and the onslaught of the 1990 recession, contracts expired Apr. 30 for almost 35,000 paper industry workers in the eastern provinces. Most workers are members of CPU, although the French Canadian union, La Fédération des Travailleurs du Papier et de la Forêt (FTPF), represents 14,000 workers in Quebec. CPU and its target company, Stone-Consolidated, hammered out a compromise "pattern" contract in July that provided an attractive pay hike and vacation pay raise for workers but also allowed the company flexibility with job descriptions and the ability to operate its mills on two statutory holidays. But those provisions were considered "local issues" by CPU leadership, and the union pledged its support to any local that opposed those concessions. CPU was already on strike at Irving Pulp & Paper Ltd.'s Rothesay Paper newsprint mill in St. John, N.B., precisely over flexible trades and vacation pay issues. Maintenance workers at Rothesay struck Apr. 10, 1990, while the CPU local representing paperworkers was forced back to the job by court order. Pulp and tissue workers across the street had also struck but established a contract by May 25. The schism in St. John was a microcosm of later developments in the pattern contract negotiations that saw workers in one mill oppose items accepted by workers in another. Following the Stone settlement, scattered strikes occurred in Quebec, eventually leading to a walkout by over 3,500 workers at seven Abitibi-Price Inc. mills in three provinces. By late September, about 23% of Canada's newsprint capacity was shut down in strikes at 11 mills. Workers were also disenchanted by the lack of gains in job security and cost of living allowances.

The strike against Abitibi ended Oct. 9 when the company and union compromised on the two most contentious issues. Identical to the Stone-Consolidated pattern, the Abitibi contract called for a pay hike of 85¢ in the first year and 5.5% in each of the next years, lifting wages 16.5% by 1992, an increase in take-home pay of $11,000 on the average. Vacation pay was lifted to 2.4%, a 20% improvement, while workers granted the company increased flexibility in assigning work to maintenance employees and tradesmen. But unlike the pattern deal, Abitibi would need the permission of its union locals in order to operate its mills on statutory holidays, and the union won job security language that is designed to protect workers in the event of machine and mill shutdowns that could lead to the loss of jobs.

But many union workers remained vehemently opposed to the flexibility and holiday provisions, and new strikes occurred at Canadian Pacific Forest Product Ltd.'s Thunder Bay, Ont., pulp and paper mill and Repap Enterprises Inc.'s Miramichi paper and pulp mills in Newcastle, N.B. The tumultuous bargaining season in the East last year could repeat this year as labor contracts expire for about 18,000 western Canadian paper and pulp workers on July 1.

Environment

Clean air, dioxin are dominant concerns

■ In spite of the attempt to make pulp and paper mills more environmentally sound, the public remains leery about the industry, and government is attempting to exert more control over it. Dioxin—generated by bleaching pulp with chlorine—and clean air issues have been in the forefront in the U.S., while Canada has focused on developing national regulations on mill effluent.

WATER. In mid-1990, EPA announced that dioxin levels in finished paper products had been cut to the point where they were just about safe, though it asked the Food & Drug Administration to take responsibility for further lowering the "already low risks" tied to the presence of dioxin in food packaging. However, EPA indicated there was still a way to go in reducing dioxin in production waste to acceptable levels. And the agency considered the consumption of fish downstream from pulp mills a very real hazard, saying it planned to "greatly lower dioxin discharges into those waters." EPA has suggested a limit on dioxin in streams of 0.013 parts per quadrillion (ppq), even though technology is not yet available to detect such low residues. However, ISSUE FOCUS: CAPITAL SPENDING

Capital Spending Plans: 1990-92

After two years of record increases, the capital spending boom will begin to play out in 1991

By CARL ESPE, News Editor

Paper industry capital spending has boomed for the past two years, but the slowdown in business that began last year will lead to a slowdown in investment this year in both the U.S. and Canada. In *Pulp & Paper*'s annual year-end survey of spending plans, U.S. companies reported plans to spend $17.0 billion on mill improvements over the 1990-92+ period, down 5.5% from plans reported at this time last year for 1989-91.

The downturn is more pronounced in Canada, where pulp and paper companies now report plans to spend C$10.2 billion on mill improvements over the 1990-92 period. That total is down 21.1% from plans reported last year for 1989-91. Canadian companies have been battered by weak markets for newsprint and pulp, their major commodities, and by a strong currency that cuts into sales recorded in U.S. dollars.

Projects for startup in 1990 account for $7.1 billion of overall U.S. spending plans. So far, announcements total $5.7 billion for 1991, $2.4 billion for 1992, and $1.4 billion for 1993. This pattern of progressively lower outlays is more evidence for a downturn in spending, since the past few strong years have followed the opposite pattern. Projects completed in 1990 account for C$4.6 billion of the Canadian total. Thus far, companies have announced plans to spend C$3.2 billion on projects for startup in 1991, C$1.4 billion in 1992, and C$967 million in 1993 and beyond.

The backlog of "proposed" projects—under active consideration but not yet approved—has risen to $7.3 billion in the U.S., up over 25% from last year. This total includes several speculative projects that are seeking financing, however, and it is doubtful that some of them will be approved during the current slump. Mechanical pulp mill proposals in particular appear unlikely to proceed because of weak markets. Proposed projects in Canada account for a potential C$6.9 billion in new spending, up over 60% from last year's backlog of C$4.3 billion. As in the U.S., however, this total includes several projects unlikely to be approved anytime soon.

While investment plans are definitely being scaled back, it is worth noting that spending will remain very high in historical terms. Outlays planned in the U.S. for 1990-92 are twice as high as for 1987-89 and over 65% greater than 1981-83, the peak of the last capital spending cycle. While the year-over-year percentage figures are down, spending remains high in absolute terms.

ENVIRONMENTAL PROJECTS LEAD THE WAY. Environmental improvements have replaced capacity expansion as the driving force behind spending plans. At existing mills, environmental projects now account for 11.1% of total spending in the U.S., up from 6.9% last year and 5.0% two years ago. In Canada, environmental projects account for 24.9% of planned outlays, up from 15.9% at the beginning of 1990 and 5.5% the year before that. Most of this increased spending will go toward reducing dioxin formation, installing secondary treatment facilities, and controlling odor at kraft pulp mills.

Capacity expansion will remain high in 1991 but will tail off rapidly next year as the boom plays out. Major capacity additions for coated and uncoated free-sheet are coming online this year and next, and a cycle of above-average growth in newsprint will be largely completed this year. Looking ahead, capacity growth will be strongest in recycled grades, including tissue, newsprint, and containerboard. Deinked pulp installations are booming thanks to legislated demand for recycled-content paper, and the major tissue producers are gearing up for a period of above-average capacity expansion.

Record capacity expansion is the main reason investment plans shot through the roof two years ago—and why they will remain relatively high at least through 1991. In the U.S., capacity expansion will peak this year with a 3.8% increase, the largest in over 25 years. In Canada, severe cutbacks in expansion activity will still allow for annual growth over the next two years well above the rate of the previous ten years. As the capacity expansion boom winds down, however, spending will drop as well. Planned outlays for new paper machines in the U.S. totaled $4.7 billion in the latest survey, down 9.1% from last year. Spending plans for new mills dropped from $3.3 billion in last year's survey to $3.1 billion this year, a decline of 6.7%. In Canada, outlays for new paper machines are expected to total C$1.3 billion over the 1990-92 period, down 46.5% from last year. Spending for new mills will fall 25.4% to C$2.4 billion.

ABOUT *P&P*'S ANNUAL SURVEY. Now in its twenty-seventh year, *P&P*'s annual capital spending survey covers expansion and modernization programs at U.S. and Canadian mills. Unlike surveys that track spending by year, *P&P*'s survey covers spending by project. Dollar figures represent the total cost of reported projects and often include supporting equipment. The total cost of multiyear projects is assigned to the startup year and is not divided among the years of expenditure. Each survey primarily covers a three-year period—the current survey covers 1990-92, but projects with firm startup dates beyond that time frame are also included. ■

UNITED STATES

RECYCLING AND ENVIRONMENTAL IMPROVEMENTS LEAD SPENDING PLANS

■ After six consecutive years of record outlays, U.S. pulp and paper companies have trimmed their capital spending plans for 1990 and beyond in the face of deteriorating profits and sluggish growth. Companies have invested heavily over the past several years to expand capacity, cut costs, improve product quality, and meet environmental standards, but the spending boom appears to have peaked in 1990.

Solid evidence for a slowdown began to appear early last year, as companies lowered their 1990 capital plans. In late 1989, the industry reported plans to spend $17.92 billion on capital projects in 1990, according to the Census Bureau. But in April 1990, that figure had fallen by about $200 million, or 1.1%, from the earlier forecast. A downward revision of 5.1% in planned outlays for the second quarter was responsible. While the Census Bureau revised its forecast up by 0.9% in September, further downward revisions are likely this year as the industry responds to slower demand, excess capacity in some grade segments, and reduced profitability.

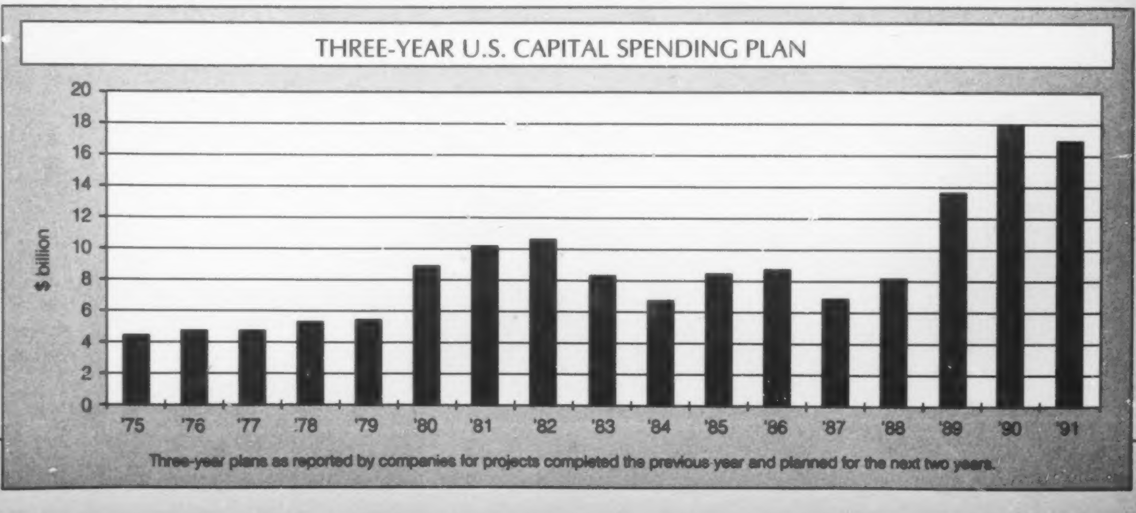
In *P&P*'s end-of-year survey, U.S. companies reported plans to spend $17.0 billion on projects for completion during the 1990-92+ period, a cutback of 5.5% from plans reported a year earlier for the 1989-91+ period. Spending on projects for startup in 1990 was about 10% higher than expected a year ago, but commitments for 1991 and especially 1992 have slowed dramatically. Companies are announcing new projects at about half the rate of the past few years.

Among U.S. companies with the largest capital programs are International Paper Co., Champion International Corp., and Weyerhaeuser Paper Co. Scott Paper Co. plans to spend about $1.4 billion over the 1990-91 period, and while specific spending amounts are not available, Procter & Gamble Co. has announced plans for a major expansion of its toilet tissue and paper towel business. Temple-Inland also plans major mill improvements, focusing on recycled containerboard grades.

After purchasing Great Northern Nekoosa Corp. last year, Georgia-Pacific Corp. plans to reduce debt incurred in the acquisition as rapidly as possible. Analysts report that G-P management is determined to keep capital spending as low as possible during this period, somewhere in the $400- to $500-million range required to cover annual maintenance costs.

James River Corp. announced a major reorganization in August 1990 that will lead to sweeping changes in the company's structure. One consequence of the restructuring will be an increase in capital spending to expand the company's core businesses. The company plans to proceed with a new lightweight-coated groundwood paper machine for St. Francisville, La., as well as modernizing and expanding existing machines at the western business and printing paper mills in Camas, Wash., and Clatskanie (Wauna), Ore. Over the next three years, new tissue machines will be installed at Naheola, Ala., and Old Town, Maine, and existing machines will be expanded and modernized at Naheola and Green Bay, Wis.

SPENDING BY AREA. Production-related expenditures total $15.1 billion for 1990-92, down 9.7% from last year's survey results. Spending for new paper machines is down 9.1% from last year, but outlays for paper machine modernizations and rebuilds are up 3.9%—the


THREE-YEAR U.S. CAPITAL SPENDING PLAN

Three-year plans as reported by companies for projects completed the previous year and planned for the next two years.

only category to post an increase over last year. Spending for pulp mill improvements, the largest category in dollar terms, is off 3.3% from last year's survey, while woodyard expenditures are down 43.9%. Power plant spending, which has so far been unaffected by the Middle East crisis, is down 22.5% for the 1990-92 period. Reliance on cogenerated power sources built, owned, and operated by outside contractors has played a major role in lowering spending for power generation projects.

Spending for environmental improvements jumped to $1.9 billion in this year's survey, an increase of 51.5% over last year. Three years of increases have pushed environmental spending to its highest level since the 1970s. Higher spending for environmental programs will be necessary over the next several years to comply with more stringent regulation of both water and air pollution. Current spending plans for environmental improvements make up 11.1% of total outlays, up from 6.9% last year but still well shy of the 1970's level.

Combating water pollution remains the industry's highest environmental priority, particularly to limit dioxin formation at bleached kraft pulp mills. Spending plans for water quality improvements total $1.1 billion for 1990-92, up 54.0% from last year. Spending for air quality improvements totals $758 million, an increase of 51.1%. Outlays to handle solid waste total $74 million in this year's survey, up 25.8%. These figures are quite conservative since a significant portion of pulp mill spending is, in fact, driven by environmental considerations.

OVER $6 BILLION FOR PULPING PROJECTS. Pulp mill expansion and modernization projects captured the largest share of spending in this year's survey. Mills reported plans to spend $6.2 billion on pulping projects during the 1990-92 period, or 41% of overall spending. Pulp mill spending accounted for 38% of total outlays in the 1989 survey and 35% the year before.

Capacity expansion, environmental upgrading, and cost reduction are the three most important factors in current pulp mill spending plans. Mills are expanding both market pulp capacity and captive pulp capacity to support more paper and paperboard production. Environmental improvements center on odor control and on reducing chlorine use to limit dioxin formation.

High prices and tight markets made market pulp capacity expansion the driving force behind pulp mill spending in the late 1980s, leading to a number of expansion projects scheduled to come online in the 1990-92 period. Several of these projects are at mills that did not previously produce market pulp.

Four major projects completed in 1990 will add almost 500,000 tpy of bleached kraft market pulp capacity at a cost of over $800 million. In the largest, Weyerhaeuser started up a new 358,000-tpy mill at Columbus, Miss., at a cost of $500 million. Bowater Inc. built a complete new bleached kraft pulp mill at Calhoun, Tenn., at a cost of $205 million. The other two projects improve existing facilities at James River Corp., Camas, Wash., and Louisiana-Pacific Corp., Samoa, Calif.

In 1991, Parsons & Whittemore Inc. will complete construction of a new $700-million bleached softwood kraft market pulp mill at Claiborne, Ala. The Alabama Pine Co. mill will have capacity for 1,250 metric tpd. Stone Container Corp.'s Port Wentworth, Ga., mill will start up a new 740-tpd bleached hardwood kraft market pulp mill as part of a $335-million modernization, and Union Camp Corp. will complete a 105,000-tpy market pulp facility in its $675-million expansion program at Eastover, S.C. Potlatch Corp. plans a new oxygen delignification system and single pulp line to add 45,000 tpy

U.S.—REPORTED CAPITAL EXPENDITURES FOR 1990-92 +
BY REGION AND TYPE OF FACILITY ($000)

	PRODUCTION-RELATED EXPENDITURES											
	WOOD/FIBER		PULPING		NEW MACHINES		MACHINE MOD.		ENERGY		MISC./PLANT	
New England	0	0%	321,625	5%	376,000	8%	133,900	5%	245,250	23%	51,125	10%
Mid-Atlantic	0	0%	120,750	2%	125,000	3%	107,198	4%	52,600	5%	4,100	1%
East North Central	11,900	4%	255,941	4%	875,000	19%	416,666	17%	174,250	17%	129,233	25%
West North Central	26,250	9%	195,275	3%	304,575	7%	13,100	1%	38,490	4%	43,860	9%
South Atlantic	74,063	26%	1,801,063	29%	1,482,558	32%	589,325	24%	121,688	12%	109,735	[illegible]
East South Central	126,276	44%	2,364,036	38%	522,818	11%	570,850	23%	286,604	27%	108,216	[illegible]
West South Central	46,135	16%	276,885	4%	590,163	13%	399,400	16%	40,160	4%	48,408	[illegible]
Mountain/Pacific	0	0%	829,903	13%	394,200	8%	221,350	9%	94,500	9%	18,050	[illegible]
Total	**284,624**		**6,165,478**		**4,670,314**		**2,451,789**		**1,053,542**		**512,727**	

	ENVIRONMENTAL QUALITY SPENDING						TOTALS					
	WATER		AIR		SOLID WASTE		PRODUCTION		ENVIRONMENTAL		GRAND TOTAL	
New England	44,670	4%	20,920	3%	9,150	12%	1,127,900	7%	74,740	4%	1,202,640	7%
Mid-Atlantic	15,709	1%	19,907	3%	1,409	2%	409,648	3%	37,025	2%	446,673	3%
East North Central	109,905	10%	20,135	3%	7,785	11%	1,862,990	12%	137,825	7%	2,000,815	12%
West North Central	6,480	1%	6,480	1%	540	1%	621,550	4%	13,500	1%	635,050	4%
South Atlantic	390,176	37%	272,105	36%	27,713	37%	4,178,432	28%	689,994	37%	4,868,426	29%
East South Central	326,994	31%	211,910	28%	18,896	25%	3,978,800	26%	557,800	30%	4,536,600	927%
West South Central	20,820	2%	130,043	17%	7,438	10%	1,401,151	9%	158,301	8%	1,559,452	9%
Mountain/Pacific	140,735	13%	76,850	10%	1,200	2%	1,558,003	10%	218,785	12%	1,776,788	10%
Total	**1,055,489**		**758,350**		**74,131**		**15,138,474**		**1,887,970**		**17,026,444**	

to bleached kraft pulp capacity at Lewiston, Idaho, at a cost of $105 million. A four-year, $408-million modernization at Champion International Corp.'s Courtland, Ala., mill for completion in 1993 includes 250,000 tpy of new bleached kraft pulp capacity.

Plans for new pulp mills in Oregon face environmental challenges that have delayed one project and possibly killed another. WTD Industries Inc.'s permit application for a 300,000-tpy, $420-million bleached softwood kraft market pulp mill to be built at Port Westward, Ore., was denied in 1989, throwing the project into limbo. Pope & Talbot Inc.'s proposed $350-million expansion at Halsey, Ore., is still in the permitting process and has been pushed back from its 1991 target date.

Faced with a solid waste problem that threatens to grow to crisis proportions, over a dozen states are considering or have passed laws mandating increased use of recycled fiber in newsprint and other paper grades. This situation has led to a boom in secondary fiber expansion projects and proposals, as papermakers scramble to position themselves for what promises to be a very different market. At least 14 U.S. newsprint producers are planning to add deinking facilities over the next three years.

While virgin newsprint is suffering the effects of overcapacity, there could be a shortage of recycled newsprint over the next few years. Virtually all North American newsprint producers not using any secondary fiber currently are seriously considering some type of expansion into recycled newsprint—including those that are far away from wastepaper sources, such as Georgia-Pacific's East Millinocket, Maine, mill. Southeast Paper's new 210,000-tpy recycled newsprint machine, started up in 1989, is the sole new newsprint machine among the current crop of expansions to produce recycled grades. Alabama River Newsprint Co., which came online last summer, has announced a plan to install a 360-metric-tpd deinking plant at a cost of $55.6 million to allow production of 40% recycled-content newsprint. Media General Inc.'s Garden State Paper Co. was considering a greenfield mill for the U.S. Northeast, where the landfill problem is most acute, but the project was thrown into limbo by Media General's attempt to sell Garden State. Smurfit Newsprint has approved plans to build a 255,000-metric-tpy recycled newsprint mill in New York but has not announced the location. New recycled paperboard mills have been proposed for the Northeast by Dunkirk Containerboard in New York and Northampton Paperboard in Pennsylvania.

On the West Coast, North Pacific Paper has approved a plan to install a new newsprint machine at Longview, Wash., that includes a deinking facility capable of supplying 25% of overall mill needs. Golden State Paper, which belonged to Garden State Paper until early 1989 and which was recently sold to Jefferson Smurfit, is studying a new recycled newsprint machine for its Pomona, Calif., mill. Also in California, Daishowa America Co. Ltd. and Trans-Rim Ltd. of Seattle have announced plans to build a recycled containerboard mill in Stockton with capacity for 350,000 tpy.

Spending for paper machine modifications and improvements is up 3.9% from last year's survey. Spending plans for rebuild projects totals $2.5 billion for 1990-92.

Rebuilds have contributed the most to new capacity in the containerboard sector, where few new paper machines are being installed. Wide-nip press installations have allowed linerboard and corrugating medium producers to raise capacity for far less than the cost of new machines. Containerboard mills with extensive machine modernization programs include Gaylord Container, Antioch, Calif.; Green Bay Packaging Corp., Green Bay, Wis., and Morrilton, Ark.; MacMillan Bloedel Inc., Pine Hill, Ala.; and Jefferson Smurfit Corp., Jacksonville, Fla.

U.S. mills report plans to spend $1.1 billion on power

U.S. GREENFIELD MILL PROJECTS
(short tons)

STARTED UP IN 1990

Alabama River Newsprint, Claiborne, Ala.
220,000-metric-tpy TMP/newsprint; Valmet machine
Kimberly-Clark, Jenks, Okla.
68,000-tpy tissue mill and converting operation
Mead, Mahrt, Ala.
375,000-tpy coated natural kraft paperboard
Willamette Industries, Bennettsville, S.C.
200,000-tpy uncoated free-sheet; Valmet paper machine

UNDER CONSTRUCTION OR ANNOUNCED WITH STARTUP DATE

Alabama Pine Pulp, Claiborne, Ala. **1991**
1,250-metric-tpy market bleached softwood kraft pulp
Caithness King, Pejepscot, Maine **1991**
550-tpd deinked market pulp mill
Fox River Fiber, Kaukauna, Wis. **1991**
200-tpd market deinked pulp plant
Kimberly-Clark, Loudon, Tenn. **1991**
C & I tissue mill; about half the size of Jenks mill
Mi Ho Paper, St. Joseph, Mo. **1991**
Recycled coated and uncoated fine paper mill
Daishowa America/Trans-Rim, Stockton, Calif. **1992**
350,000-tpy recycled containerboard mill
Kenaf Paper, Raymondville, Texas **1992**
30,000-metric-tpy kenaf-based newsprint mill
Inland Container, Maysville, Ky. **1993**
600-tpd recycled containerboard; Tampella machine
Scott Paper, Indiana or Kentucky **1993**
New tissue mill and converting operation

PROPOSED (NO STARTUP DATE)

Dunkirk Containerboard, Dunkirk, N.Y.
250,000-tpy recycled containerboard mill
Formosa Chemicals & Fibre, Wallace, La.
Proposed 1,000-metric-tpd dissolving pulp mill and rayon plant
Mead, Ontonogan, Mich.
Integrated coated free-sheet mill; mid-90s earliest
Northampton Paperboard, Northampton, Pa.
300,000-tpy recycled paperboard
Port Westward Pulp, Port Westward, Ore.
300,000-tpy market bleached softwood kraft pulp
Jefferson Smurfit, Unspecified town, N.Y.
250,000-metric-tpy recycled newsprint mill
Westbrook Wood Products, Klamath Falls, Ore.
Proposed publication papers mill

plant improvements during 1990-92, down 22.5% from last year's plans. Energy projects have slipped to a 7% share of spending. Largely due to lower energy prices, mills have been able to shift spending priorities to other areas. Power plant outlays have declined steadily since the early '80s as a percentage of total mill spending.

NEW MILLS AND MACHINES. New paper machines account for 31% of announced spending plans for the 1990-92 period. New paper machine announcements climbed dramatically in the late 1980s, and now 21 new machines at existing mills and another ten machines at new mills are scheduled for startup during the 1990-94 period. The most active grades for new machines are tissue, coated and uncoated free-sheet paper, newsprint, kraft paperboard, and recycled paperboard.

Eleven new paper machines came online in 1990, seven at existing mills and four at greenfield facilities. Mead Corp. completed a new $556-million coated natural kraft paperboard mill at Phenix City, Ala. Gaylord Container started up a new 1,000-tpd linerboard machine at Bogalusa, La., the first new linerboard unit to be built since 1985. Union Camp's $375-million modernization and expansion at Savannah, Ga., will replace two older units with a new kraft linerboard machine in 1991, and Jefferson Smurfit Corp. plans a new linerboard machine for its Fernandina Beach, Fla., mill.

In uncoated free-sheet, Willamette Industries Inc. started up a greenfield mill at Bennetsville, S.C., in 1990, and Boise Cascade has completed an extensive $525-million modernization and expansion program at International Falls, Minn. Union Camp will complete a $700-million expansion in 1991 that includes a new paper machine at its Eastover, S.C., mill. Also in 1991, Georgia-Pacific will complete a $500-million expansion at Ashdown, Ark., adding 325,000 tpy.

Champion International installed a new coated free-sheet unit at its Quinnesec, Mich., market pulp mill in 1990, and Scott Paper's S.D. Warren Div. built another lightweight-coated free-sheet unit at Skowhegan, Maine. In 1991, Consolidated Papers Inc. will complete installation of a new $400-million coated free-sheet machine at the Wisconsin Rapids Div. Boise Cascade announced plans for a $450-million coated groundwood expansion at Rumford, Maine, targeted for a late-1993 completion, but the project has been deferred due to poor market conditions.

Chesapeake's Wisconsin Tissue Mills in Menasha started up a new recycled tissue mill in 1990, and Kimberly-Clark brought online a new tissue mill at Jenks, Okla. K-C will start up a second new mill in 1991 at Loudon, Tenn. Fort Howard plans to install a fourth recycled tissue machine in 1991 at Rincon, Ga., and to add capacity at Muskogee, Okla., and Green Bay, Wis. Procter & Gamble plans to install two new tissue machines at mills east of the Rockies by 1993 and is studying expansion opportunities on the West Coast that could include another machine or even a new mill. ■

NEW PAPER MACHINES IN U.S. AT EXISTING MILL SITES

STARTED UP IN 1990

Boise Cascade, International Falls, Minn.
300,000-tpy, 348-in.-trim Valmet—uncoated free-sheet
Champion International, Quinnesec, Mich.
265,000-tpy, 280-in.-trim Beloit—coated free-sheet
Chesapeake, Menasha, Wis.
80,000-tpy Beloit twin-wire—recycled tissue
Consolidated Papers, Stevens Point, Wis.
59,000-tpy, 180-in. yankee fourdrinier—specialty coated
Gaylord Container, Bogalusa, La.
1,000-tpd, 270-in.-trim Beloit machine—linerboard
Longview Fibre, Longview, Wash.
240-in.-trim No. 12 Beloit machine—kraft paper
S.D. Warren, Skowhegan, Maine
Lightweight coated free-sheet machine

UNDER CONSTRUCTION OR ANNOUNCED WITH STARTUP DATE

Consolidated Papers, Wisconsin Rapids, Wis. **1991**
212,000-tpy, 285-in. fourdrinier—coated free-sheet
Fort Howard, Rincon, Ga. **1991**
250-tpd, 270-in. Beloit machine—recycled tissue
Georgia-Pacific, Ashdown, Ark. **1991**
325,000-tpy, 4,000-fpm Beloit—uncoated free-sheet
North Pacific Paper, Longview, Wash. **1991**
230,000-metric-tpy Beloit Bel Baie III-newsprint
Union Camp, Savannah, Ga. **1991**
460,000-tpy, 363-in. Valmet kraft linerboard machine
Union Camp, Eastover, S.C. **1991**
240,000-tpy, 372-in. Beloit machine—uncoated free-sheet
Federal Paper Board, Augusta, Ga. **1992**
To produce 650 tpd of either bristols or uncoated free-sheet
Potlatch, Lewiston, Idaho **1992**
204-in.-trim, 6,500-fpm Valmet Periformer—tissue
Westvaco, Covington, Va. **1992**
350,000-tpy Voith machine—bleached paperboard
James River, Pennington, Ala. **1992-93**
New tissue machine
James River, St. Francisville, La. **1992-93**
New lightweight coated paper machine
James River, Old Town, Maine **1992-93**
New tissue machine
Procter & Gamble, eastern U.S. **1993**
Two new machines at mills east of the Rockies—tissue
International Paper, Selma, Ala. **1993-94**
300,000-tpy uncoated free-sheet

PROPOSED (NO STARTUP DATE)

Boise Cascade, Rumford, Maine
318,000-tpy, 325-in. LWC machine—delayed from 1993 target
Champion International, Courtland, Ala.
Considering 240,000-tpy uncoated free-sheet machine
Daishowa America, Port Angeles, Wash.
Studying two machines, one 220,000-tpy newsprint and one 150,000-tpy directory-delayed
Fort Howard, Muskogee, Okla. and Green Bay, Wis.
Potential sites for new recycled tissue machine
Fort Howard, Rincon, Ga.
Fifth recycled tissue machine for installation in mid-90s
Georgia-Pacific, Millinocket, Maine
Proposed world-class dry-crepe tissue machine
Golden State Paper, Pomona, Calif.
230,000-metric-tpy machine—recycled newsprint
Gulf States Paper, Demopolis, Ala.
Bleached paperboard machine; mid-1990s target
Lake Superior Paper Industries, Duluth, Minn.
A second SC-A paper machine is under study
Manville Forest Products, West Monroe, La.
Considering 800-1,000-tpd SUS coated board machine
Procter & Gamble, western U.S.
Considering new machine for West Coast location—tissue
Weyerhaeuser Paper, Springfield, Ore.
1,000-tpd linerboard machine, replacing older unit

CANADA

MILLS PLAN FEWER EXPANSIONS, MORE EMPHASIS ON ENVIRONMENT

■ After three years of record increases, Canadian pulp and paper companies cut back on capital spending in 1990, and further cutbacks are slated for 1991. According to the latest Statistics Canada data, the industry planned to spend C$4.44 billion on capital projects in 1990, down 13.5% from outlays of $5.13 billion in 1989. Canadian pulp and paper companies enjoyed strong markets and record prices during the late 1980s, enabling them to spend heavily for modernization and expansion projects. If spending drops off as expected, it will end three years of double-digit increases. The last period of such strong growth was ten years ago, when capital expenditures soared over 60% in both 1980 and 1981.

The industry has been plagued by lower prices for newsprint, a strong currency, and deteriorating markets for pulp, leading to lower profitability and cutbacks in capital spending. More directly, spending plans have dropped because of environmental concerns about massive greenfield development plans in western Canada. Alberta-Pacific Forest Products Ltd.'s proposed new $1-billion bleached kraft market pulp mill at Athabasca, Alta., is the best example. Originally slated for startup in 1991, the project is in danger of being canceled outright because of local concerns about the mill's impact on the environment (the Alberta-Pacific mill is not included in cost totals for this report).

While threatening new development, concerns about the environment will nevertheless fuel higher spending at existing mills over the next few years. The Canadian Pulp & Paper Assn. estimates that about 25% of capital expenditures in 1989 went for environmental programs. Spending for dioxin elimination, recycled fiber facilities, and air emission improvements is expected to remain high for the next several years. CPPA estimates that the industry must spend approximately C$3 billion a year to maintain and upgrade facilities to improve productivity and competitiveness. The additional need for environmental improvements should keep spending above this level. While markets remain weak, mills will cut back on expansion projects and concentrate their efforts in the environmental area.

Repap Enterprises Inc., for example, expects to cut its capital spending on all but environmental improvements and will postpone new projects, chairman George Petty said at the company's annual meeting. After spending $2.3 billion in the past five years, the company will invest only $100 million in 1991 and 1992. Repap had planned to spend $1.1 billion on a two-phase expansion and conversion of the Manfor mill in The Pas, Man.

Fletcher Challenge Canada Ltd. reduced its 1990 capital spending budget to $279 million from a previously estimated $425 million in the face of weaker pulp markets and heavy costs associated with meeting environmental standards, Ian Donald, president and CEO, said after his company's annual meeting. "We're down to spending only on those projects that are needed to meet environmental standards," he noted. Other projects, such as the proposed debottlenecking of the company's Mackenzie, B.C., pulp mill, have been deferred. The

CANADA—REPORTED CAPITAL EXPENDITURES FOR 1990-92 +
BY REGION AND TYPE OF FACILITY (C$000)

	PRODUCTION-RELATED EXPENDITURES											
	WOOD/FIBER		PULPING		NEW MACHINES		MACHINE MOD.		ENERGY		MISC./PLANT	
Maritimes	26,040	9%	35,092	1%	0	0%	25,900	4%	12,000	2%	3,645	1%
Quebec	34,165	11%	1,218,793	27%	712,250	54%	223,131	31%	59,271	11%	100,974	40%
Ontario	12,100	4%	775,829	17%	245,000	19%	205,530	28%	151,250	27%	1,500	1%
Central	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
West	229,470	76%	2,441,811	55%	362,950	27%	270,000	37%	336,540	60%	146,122	58%
Total	**301,775**		**4,471,525**		**1,320,200**		**724,561**		**559,061**		**252,241**	

	ENVIRONMENTAL QUALITY SPENDING						TOTALS					
	WATER		AIR		SOLID WASTE		PRODUCTION		ENVIRONMENTAL		GRAND TOTAL	
Maritimes	63,575	3%	59,000	11%	6,325	9%	102,677	1%	128,900	5%	231,577	2%
Quebec	319,129	17%	69,135	12%	35,071	52%	2,348,584	31%	423,335	17%	2,771,919	27%
Ontario	119,601	6%	16,020	3%	510	1%	1,391,209	18%	136,131	5%	1,527,340	15%
Central	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
West	1,391,379	73%	417,675	74%	25,929	38%	3,786,893	50%	1,834,983	73%	5,621,876	55%
Total	**1,893,684**		**581,830**		**67,835**		**7,629,363**		**2,523,349**		**10,152,712**	

Mackenzie program would have added 40,000 tpy of market pulp capacity.

Canfor Corp. reduced capital spending from its previously budgeted C$160 million in 1990. Western Pulp Ltd. Partnership, recently acquired by Doman, plans to spend $70 million on environmental improvements over the next three years, but no other major capital projects are presently under consideration.

In eastern Canada, Abitibi-Price is preparing a new strategic plan. The company has not earmarked any more mills or machines for closure, but it will continue to concentrate on converting old mills to more specialized products. Environmental spending at Abitibi will also remain high. Estimated spending totaled $150 million in 1990, down from $260 million in 1989.

As in the U.S., companies are scrambling to install deinking capacity to meet demand for recycled paper. Abitibi-Price, Boise Cascade Canada Ltd., Bowater Mersey Paper Co., and Stone-Consolidated Inc. have all stated publicly that they are studying plans to incorporate secondary fiber in their newsprint operations. Donohue Inc. and James Maclaren Industries Inc. have proposed a joint-venture facility for Montreal. Cascades Inc., Noranda Forest Recycled Papers, and Kruger Inc. are also considering deinking expansions, and Orford Recycling Inc. has proposed a 120,000-tpy market deinked pulp mill for Drummondville, Que. Atlantic Packaging Products Ltd. will complete a new recycled newsprint and tissue mill this year in Whitby, Ont., and Daishowa Forest Products Ltd. announced last summer that it will install a large deinking plant for recycled newsprint and directory paper production at its Quebec City, Que., mill. In western Canada, Fletcher Challenge Canada and MacMillan Bloedel have agreed to take the output of a new market deinked pulp plant to be built by Newstech Recycling Inc. in Coquitlam, B.C. There are currently no deinking facilities in western Canada.

NEW PAPER MACHINES IN CANADA AT EXISTING MILL SITES
(metric tons)

STARTED UP IN 1990

Canadian Pacific Forest Products, Thunder Bay, Ont.
240,000-tpy, 362-in. Valmet machine, replacing two—newsprint
Cascades, Kingsey Falls, Que.
25,000-tpy tissue machine
Stone-Consolidated, Grand'Mere, Que.
183,000-tpy machine, replacing two older units—groundwood specialties

UNDER CONSTRUCTION OR ANNOUNCED WITH STARTUP DATE

Kruger, Trois Rivieres, Que. 180,000-tpy, 300-in.-trim Beloit machine—newsprint	**1991**
Perkins Papers, Candiac, Que. 48,500-short-tpy Valmet machine—recycled tissue	**1991**

PROPOSED (NO STARTUP DATE)

MacMillan Bloedel, Powell River, B.C.
Mill upgrade may include new machine for higher-value grades
Vicell Canada Tissue, Delta, B.C.
9,000-tpy dry-form tissue machine

SPENDING BREAKDOWN. Canadian pulp and paper companies report plans to spend C$10.2 billion on mill projects during the 1990-92 period, down 21.1% from plans reported last year for the 1989-91 period. Projects started up in 1990 account for C$4.6 billion of the total, or 45%. Commitments for 1991 total C$3.2 billion, or 31% of planned outlays. Projects announced so far for future years amount to C$1.4 million for 1992, C$732 million for 1993, and C$235 million for 1994-95.

As in the U.S., the number of project announcements is trending downward in Canada. Because of project cancellations and postponements, announced spending for 1992 has fallen 57% since this time last year. Just over C$1 billion worth of projects originally scheduled for the 1990-92 period has been canceled outright, while another C$2.8 billion has been postponed.

Production-related projects account for C$7.6 billion of overall spending, down 29.5% from last year's survey. Spending is down in every part of the mill, led by a 46.5% drop in installations of new paper machines. Pulp mill improvements, the largest category in dollar terms, total C$4.5 billion, down 20.7% from last year.

Environmental expenditures climbed to C$2.5 billion for 1990-92, up 23.2% from plans reported last year for 1989-91. Spending for water quality improvements posted an 18.9% gain, to C$1.9 billion, following a 506% gain last year and a 122% increase the year before that. Companies reported air pollution control projects costing C$562 million for 1990-92, up 45.4% from last year. Spending for solid waste disposal is down 2.9%, however, to C$68 million.

CAPACITY EXPANSION BOOM. Growth rates have been higher than average in the Canadian industry since 1986, culminating in record expansion plans at the end of the decade. Business conditions began to sour in 1989, but the expansion boom continued to take shape, and in 1990, the industry found itself in the middle of a capacity expansion boom in its major grade segments as well as in a steep market downturn. Capital spending plans have plunged, and the three-year outlook for capacity expansion is down 20% from this time last year. Because those original plans were ambitious, however, overall growth will remain above average through 1992 despite the cutbacks.

Kraft market pulp capacity will climb to 7.86 million tpy by 1992, according to CPPA, an increase of 757,000 tpy, or 10.7%, over 1989. The high point of the boom appears to be 1991, when 426,000 tpy of new capacity will be added for a one-year increase of 5.8%.

Bleached softwood kraft pulp capacity is expected to climb 355,000 tpy by 1992, a gain of 6.2% over 1989. Two major projects were completed in 1990 at existing mills: Howe Sound Pulp & Paper Co. Ltd.'s 350-tpd expansion at Port Mellon, B.C., and Weldwood of Canada Ltd.'s 215,000-tpy doubling of capacity at Hinton, Alta. In addition, Daishowa Canada Co. Ltd. recently brought online its new 340,000-tpy mill in Peace River, Alta.

In late 1991, Fletcher Challenge Canada Ltd. and James River-Marathon Ltd. are scheduled to complete major improvement programs adding 75,000 tpy and 178,500 tpy, respectively. A 235,000-tpy expansion program at Celgar Pulp Co.'s Castlegar, B.C., mill is targeted for completion in mid-1992.

Bleached hardwood kraft pulp capacity will jump 391,000 tpy by 1992 to 1.36 million tons, a substantial 40.4% increase over 1989, according to CPPA. Most of the extra capacity will result from three sources: Daishowa Canada's new Peace River mill; James Maclaren Industries Inc.'s 75,000-tpy expansion at Thurso, Que., in 1990; and Malette Inc.'s 1990-92 modernization program at Smooth Rock Falls, Ont., adding about 70,000 tpy of softwood and hardwood kraft output.

Mechanical market pulp has been one of the fastest growing sectors in Canada, but because of depressed markets it is unclear exactly how much of the announced new capacity will actually be built. Most observers report that mills are holding back until conditions improve. Even with a slowdown in new plans, however, capacity growth through 1992 will remain strong due to projects already under way or recently completed.

Donohue-Matane Inc. and Slave Lake Pulp Corp. were scheduled to complete new bleached chemi-thermomechanical pulp (CTMP) mills in late 1990. The Donohue mill in Matane, Que., will have capacity for 190,000 tpy, while the Slave Lake, Alta., mill will produce 110,000 tpy. In first-quarter 1991, Louisiana-Pacific Corp. plans to complete its new 157,500-tpy bleached CTMP plant in Chetwynd, B.C.

After a 50,000-tpy increase in 1990, newsprint capacity will jump 530,000 tpy this year, mostly on the strength of five new paper machines coming online in 1990 and 1991. A 300,000-tpy increase is slated for 1992.

Alberta Newsprint Co. Ltd. started up a new 220,000-tpy newsprint mill at Whitecourt, Alta., in fall 1990, and Atlantic Packaging Products Ltd. plans to bring a new 150,000-tpy machine online in late 1990 or early 1991. Canadian Pacific Forest Products Ltd. and Kruger Inc. also plan to start up new machines in late 1990/early 1991. CPFP's new 240,000-tpy No. 5 machine at Thunder Bay, Ont., will replace two older units for a 60,000-tpy net increase in capacity. Kruger's new machine at Trois Rivières, Que., will have capacity for 180,000 tpy, but about 70,000 tpy of the increase will be offset by conversion of No. 4 machine at Corner Brook, Nfld., to produce supercalendered paper. And also coming online will be Howe Sound Pulp & Paper Co. Ltd.'s new 535-tpd mill at Port Mellon, B.C., scheduled for startup in July 1991.

The current expansion boom was originally expected to be much larger than it has turned out to be, although it is still larger than any growth period since the 1970s. Collapsing prices put the squeeze on newsprint companies in 1989, resulting in a series of project cancellations, postponements, shutdowns of high-cost capacity, and conversions to other grades.

Four new machines will raise sanitary paper capacity by 31.4% to 666,000 tons in 1992. Atlantic Packaging Products, Whitby, Ont., and Irving Tissue Ltd., Saint John, N.B., each added a new machine early in 1990, and a third machine started up in early 1990 at Cascades Inc.'s Kingsey Falls, Que., mill. In mid-1991, Perkins Paper will start up a tissue unit at Candiac, Que. ■

CANADIAN GREENFIELD MILL PROJECTS
(metric tons)

STARTED UP IN 1990

Alberta Newsprint, Whitecourt, Alta.
220,000-tpy CTMP/newsprint mill
Atlantic Packaging Products, Whitby, Ont.
Recycled 35,000-tpy tissue and 150,000-tpy newsprint; two Voith machines
Daishowa Canada, Peace River, Alta.
340,000-tpy bleached hardwood kraft market pulp
Donohue Matane, Matane, Que.
190,000-tpy bleached market CTMP
Slave Lake Pulp, Slave Lake, Alta.
110,000-tpy market bleached CTMP

UNDER CONSTRUCTION OR ANNOUNCED WITH STARTUP DATE

Howe Sound Pulp & Paper, Port Mellon, B.C. **1991**
535-tpd TMP/newsprint mill; Valmet machine
Louisiana-Pacific, Chetwynd, B.C. **1991**
157,500-tpy bleached market CTMP
Newstech Recycling, Coquitlam, B.C. **1991**
122,500-tpy market deinked groundwood pulp
Interchem Industries, Port Clement, B.C. **1992**
100-tpd bleached sulfite market pulp mill
Millar Western Pulp, Whitecourt, Alta. **1992**
240,000-tpy bleached market CTMP mill

PROPOSED (NO STARTUP DATE)

Alberta-Pacific Forest Industries, Athabasca, Alta.
500,000-tpy bleached kraft market pulp; delayed by environmental challenge
Orenda Forest Products, Stewart, B.C.
300-tpd market bleached mechanical pulp mill
Orford Recycling, Drummondville, Que.
122,000-tpy market deinked pulp mill
Shin Ho Canada, Thunder Bay, Ont.
150,000-tpy bleached hardwood CTMP mill
Stake Technology, Mont Joli, Que.
100,000 bleached high-yield hardwood market pulp

*Complete results of P&P's exclusive survey of North American capital spending programs for 1990-92 are available in a separate **Mill-by-Mill Listings** report. Organized by company, the listings show programs for new mills and machines, rebuilds and modernizations, environmental quality control, and other mill improvements, with specifics on equipment ordered, dates, suppliers, and prices, where available. Subscribers to P&P's monthly newsletter, Project Report, receive a free copy of the report with their January issue. All others may obtain a copy of the report for US$145. To order, send payment to Pulp & Paper, Editorial Dept., 600 Harrison St., San Francisco, Calif. 94107.*

Paper Industry Engineering Salaries Back on Track with Median at $53,000

While salaries return to a normal upward trend, job morale is declining, possibly due to industry downturn, takeovers, and consolidation

By KELLY H. FERGUSON, Projects Editor

Following a slight decrease in 1989, professional salaries in the pulp and paper industry seem to be back on an upward track, according to *Pulp & Paper*'s 1990 salary and opinion survey. The 1989 survey showed a median salary of $52,000, down from $53,000 in 1988. The median salary is now back at $53,000, and in analyzing the 1989 results, this slight "dip" seemed at least partially due to an increase in entry-level professionals and the retirement of some older employees.

The 1990 survey results seemed to position professional salaries back in line with increases shown in previous surveys. Analysis of the age distribution of respondents shows a slight decrease in the percentage of younger professionals from 1989 to 1990, where there had been an increase from 1988 to 1989.

However, high operating rates and the numerous capital projects under way during 1990 continued to attract younger engineers to the industry—a fact that seemed to keep the median salary from reaching higher than the 1988 level. About 40% of respondents had been with their current employer five years or less. In actual number of years, 11% said they have been with their current employer one year or less and 11% said two years.

BACKGROUND OF SURVEY. *P&P*'s annual survey is based on responses to a questionnaire included in the September 1990 issue. Information from the returned forms was processed by an independent data processing firm according to *P&P*'s specifications. Data from 1990 are compared with data from our 1989 survey to provide readers a perspective on changes in compensation, benefits, and employee attitudes.

The report is designed to compare the progress of employees (specifically engineers) in the paper industry, on the supplier and consulting side as well as in primary manufacturing, with professional peers in various other disciplines. In addition, the report compares the salaries of specific engineering types and functions within the paper industry.

TABLE 1: **Salary distribution of all respondents.**

	Salary ($1,000)		
	1990	1989	% change 1989-90
Lower decile	36	33	+9
Lower quartile	43	41	+5
Median	53	52	+2
Upper quartile	67	65	+3
Upper decile	82	79	+4

AN OVERALL PROFILE. Respondents' median income has increased 2% since 1989 (Table 1), and comparing the salary distribution with 1988 results shows that salaries are probably returning to the trend of steady increases, although the higher salary level (upper decile) is still $3,000 less than in 1988. This again shows that retirement is possibly cutting out older, higher-paid respondents.

Most respondents (88%) continue to be happy with their jobs. However, there is a significant shift in attitude toward paper industry employment, especially concerning whether respondents would stay in the paper industry if they changed jobs. In 1989, 85.3% said they would stay in the paper industry. The 1990 results show that only 64% would stay, 4% would leave, and 30% weren't sure.

There is an indication that some experience is leaving the industry. In comparing the distribution of years of experience in the industry, there was about a 5% decrease in respondents with ten to 20 year's experience. This range of years has typically increased in past surveys. Also in past surveys, chemical engineers have normally made up the largest single group of respondents. But the 1990 survey had significantly less chemical engineers responding (12% in 1990 compared with 17% in 1989). This decrease possibly indicates a shift by chemical engineers to other industries (such as petroleum, food) that are experiencing an upturn as the paper industry begins a downturn.

Mechanical engineers made up the largest percentage of bachelor degrees for respondents (16%). Business de-

Reader opinions

Pulp & Paper's salary survey asked readers to comment on the industry, their jobs, and their companies. Most opinions focused on readers' reasons for low morale, such as declining benefits, company restructuring, and problems with management. Comments have not been edited for content (only for grammar and style as necessary) to retain their originality. The following were chosen as typical of responses received.

"I've just changed from shift leader to process engineer. It's just like emerging from a dark, wet sewer into the light of day."
—technical service/Midwest

"Everyone needs to cut down on all the paperwork these days. We spend too much time justifying our work, which is holding our country back."
—engineering design/Midwest

"I am finding that there are not many young people like me that are interested in this industry."
—product development/West

"Engineers need higher, long-term salaries to attract more people to the field."
—process control/Southeast

"My company does a lot of good R & D, but very little gets implemented by us. We need to improve the link between development and implementation."
—R & D/Northwest

"After working in the chemicals industry, I am surprised at the lack of progressive attitudes and actions in the pulp and paper industry."
—R & D/Southeast

"I feel the company should sponsor people from our mill to go to other mills to see how they operate, then return to our mill with a report."
—production and mill operations/Southeast

"Wood procurement management is the best job in the paper industry."
—wood procurement/Northeast

"Our company fills nearly all high-level jobs from outside. This is demoralizing to experienced, highly trained, loyal employees."
—engineering/Southeast

"Too conservative, old guard is not allowing sufficient compensation to keep three- to ten-year employees on board."
—sales and marketing/Northeast

"We must do a better job of training hourly employees."
—engineering/Southeast

"Having the ability to practice my degree and participate in profit sharing/bonuses would help keep me at my present location."
—production and mill operations/Southeast

"Too much travel in my job. I'd leave just to get away from that. Otherwise, I love my work."
—technical service/Mid-Atlantic

"It has been a good industry for me to work in, but I don't encourage my children to get into it."
—engineering/Northwest

"Our business is very project oriented, and thus at times, it requires extensive overtime, for which management is not compensated. This needs to change if we are to continue to attract high-quality candidates."
—production and mill operations/West

"As the company increases in size, the impersonal character grows disproportionately. The ability to get meaningful input is approaching zero."
—administration/Northwest

"During the past two years, our company has begun employee involvement and SPC training, which has created a lot of strength in its task force teams. They are genuine in their concern for employees."
—administration/Southeast

"The paper industry is socially irresponsible, and I am seeking employment in a decent industry."
—sales and marketing/Northeast

"The paper industry must become more liberal with vacations to match other industries. Otherwise, it is the most fascinating industry I've been associated with."
—production and mill operations/Midwest

"Tremendous changes are taking place with quality and management-style programs."
—production and mill operations/Northwest

"Too much emphasis is placed on achieving goals by the time set, despite unexpected serious problems and the fact that the time factor was initially arbitrary. Effective problem-solving counts for nothing if arbitrary deadline is missed."
—process control/Mid-Atlantic

"My company reorganizes every two to four years and ends up with more administrators and fewer people to do the work."
—engineering/Northwest

"I wish they built paper mills in nicer locations."
—production and mill operations/Northeast

grees remained almost the same (16%), as did paper science and technology (14%).

Other averages for respondents were drawn: the majority is male (94%), has a bachelor's degree (58%), and works for a wood products/pulp and paper manufacturer (64%) in either production/mill operations (17%), engineering design (16%), or technical service/quality control (14%). Job stability has been steady during 1990, with about 20% having changed employers in the last three years. Other statistics include the following:

Compensation

- The average number of salary increases in the past three years is three.
- The last pay increase for respondents was 5%.

TABLE 2: **Benefits of respondents.**

Benefits	% of respondents 1990	1989
Medical insurance	98	98
Life insurance	94	94
Retirement pension plan	88	88
Dental insurance	85	84
Education allowance	50	49
Stock option plan	39	41
Profit sharing	38	36
Bonus plan	34	33
Travel budget	25	28
Company car	12	13

TABLE 3: **Income and type of employment organization.**

	Income ($1,000)					
Employing organization	Lower decile	Lower quartile	Median	Upper quartile	Upper decile	% change in median 1989-90
Academic	40	40	52	115	115	+44
Government	24	30	41	51	60	+14
Wood/pulp/paper—engineering	37	45	54	65	85	+8
Wood/pulp/paper—manufacturing	36	43	53	65	80	+4
Consulting firm	36	47	60	75	89	−8
Self-employed consultant	44	55	78	98	150	+18
Wood/pulp/paper—supplier	35	45	55	70	85	+4
Wood/pulp/paper—converter	35	44	49	60	72	−2
Other	35	42	50	72	96	−9

TABLE 4: **Income and principal work function.**

	Income ($1,000)						
Principal function	Lower decile	Lower quartile	Median	Upper quartile	Upper decile	% change in median 1989-90	Respondents
Administration	37	50	62	82	100	−5	141
R & D	35	45	60	71	84	+13	107
Consulting	34	50	65	80	105	+7	86
Engineering design	37	45	53	64	75	+4	247
Teaching/academic	37	37	40	115	115	+33	3
Product development	35	40	51	57	63	−15	25
Production and mill/plant operation	39	45	54	68	81	+2	274
Engineering/maintenance	39	46	53	64	71	+10	170
Sales and marketing	38	45	56	73	88	+6	163
Technical service/quality control	33	37	45	55	65	0	218
Other	33	41	52	65	85	+4	122

TABLE 5: **Income and level of supervisory management.**

	Income ($1,000)					
Supervisor responsibility	Lower decile	Lower quartile	Median	Upper quartile	Upper decile	% change in median 1989-90
None	28	36	45	56	71	+10
Indirect or staff	35	40	48	60	72	+4
Team or unit	39	45	52	58	66	+8
Project or section	38	47	55	65	75	+4
Major department or division management	42	52	67	78	93	+6
Corporate management of organization	48	60	80	100	143	+1

FIGURE 1: **Income and type of wood/pulp/paper company, all respondents.**

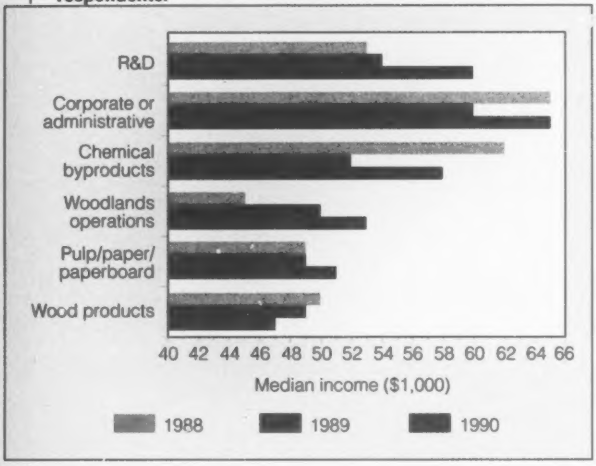
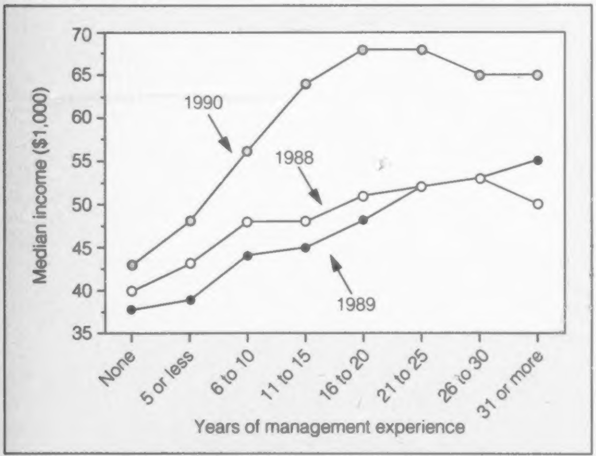


FIGURE 2: **Income and number of years of management experience.**



- Eleven paid holidays and three weeks of vacation are taken yearly.
- Most salaries are reviewed annually (90%) and are based on merit/performance (51%), cost of living (5%), or both (29%).
- Eighty-two percent are not paid overtime (a 3% decrease since 1989).
- Fifty-one percent have not been promoted in the past three years, while 34% have been promoted once.

Personal

- Ninety-six percent of respondents work full-time; 2% are self-employed.
- The average respondent's work experience since leaving school is between five and nine years (17%—a major change from 1989, when the average was between 15 and 19 years).
- Eighty-five percent have some kind of management responsibility; the majority have indirect or staff (23%), followed by major department or division management (21%).
- Twenty-six percent have advanced degrees (master's, doctorate, or MBA).
- Thirty-seven percent came from another industry.

Morale

- Sixty-four percent say they would stay in the paper industry if they changed jobs.
- Eighty percent say their company listens to them and values their experience (a decrease of 3% from 1989).
- On a scale of 1 (bad) to 5 (good), 41% ranked their job morale as above average (4), and 20% ranked their job morale as a 5. However, this is significantly lower than in 1989. In 1989, 80% ranked their morale at either 4 or 5, and there were no respondents ranking their morale as average (3). In the 1990 survey, 23% of respondents ranked their morale as average.

ANALYZING EFFECTS ON INCOME. Tables 1 through 6 and Figures 1 and 2 present survey findings on compensation compared with a number of variables, including type of employing organization, principal work function,

TABLE 6: **Income and educational field (bachelor's degree only).**

	Income ($1,000)					
Discipline	**Lower decile**	**Lower quartile**	**Median**	**Upper quartile**	**Upper decile**	**% change in median 1989-90**
Forestry/agriculture	40	42	52	68	80	−10
Chemistry	27	39	49	61	76	−4
Mechanical engineering	37	45	53	67	82	+2
Chemical engineering	36	42	50	63	80	0
Civil engineering	46	53	60	68	85	na
Electrical engineering	36	45	57	65	79	+2
Industrial engineering	39	42	54	63	77	−4
Mathematics/physics	40	44	75	85	90	+42
Computer science	34	41	53	57	60	+43
Biology/life science	36	40	47	52	58	−8
Paper science and technical	36	42	51	62	72	+34
Environmental science	30	38	46	73	75	+5
Business	31	42	50	70	85	−4
Liberal arts	34	40	50	70	95	+28
Other	25	35	44	55	69	+59

supervisory level, and degree. Income figures in all tables were obtained by adding any bonuses or additional income reported by respondents to their reported gross salaries.

Table 2 shows slight increases in the number of respondents receiving education allowance, dental insurance, profit sharing, and bonus plan. One significant decrease occurred in travel budgets, indicating that some companies are probably beginning to conserve on spending.

Table 3, comparing income and type of employment organization, shows that consultants have the highest median income, at between $60,000 (consulting firm) and $78,000 (self-employed consultant). Because of a low response, median salaries for those in academia and government are not statistically significant.

Table 4, comparing income and principal work function, shows that the highest median salary ($65,000) again belongs to those in consulting. Administration was close behind with $62,000, but that category dropped 5% from 1989. The group making the largest increase was from R&D, with a 13% increase in median income to $60,000. Engineering/maintenance also posted a significant gain (10%) to $53,000. Again, the small response from academia renders their salary numbers statistically insignificant.

Those at the corporate management supervisory level (Table 5) had the highest median income ($80,000). Table 6, as with past surveys, possibly presents misleading data comparing income and educational field. Small numbers of respondents in many of the categories make results difficult to interpret statistically.

Comparing income with number of years with current employer shows that staying with one employer pays off. Income rises throughout years one to 20 but levels off at that point.

Figure 1 compares income and the type of wood/pulp/paper company for respondents. Wide swings in the chemical byproducts category are not statistically significant due to a small response. R&D continued a gain in median salary as did most others, except in wood products, which showed a 4% decline. As expected, for those who do manage, income increases with the number of years of management experience (Figure 2). ■

Full results of *P&P's* 1990 salary and opinion survey are available for $50, payable to MILLER FREEMAN PUBLICATIONS. Please send requests to:

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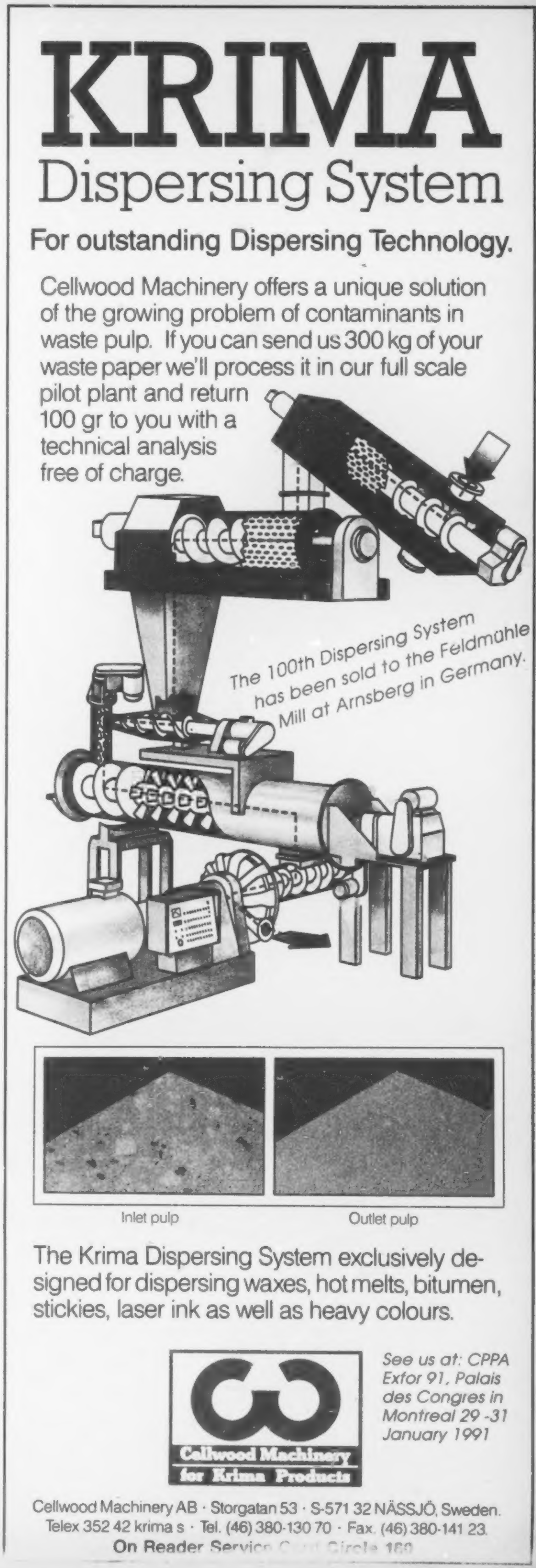

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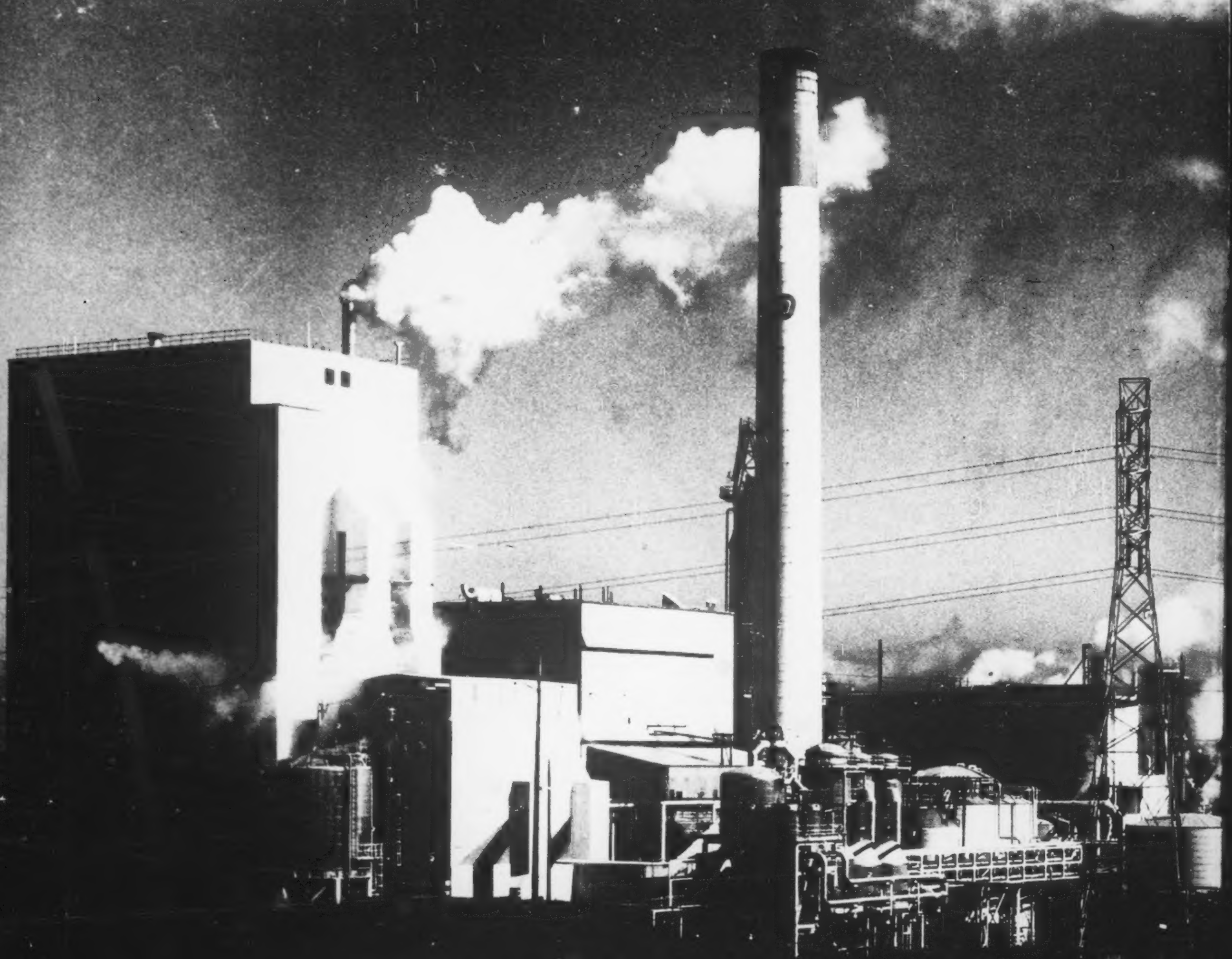

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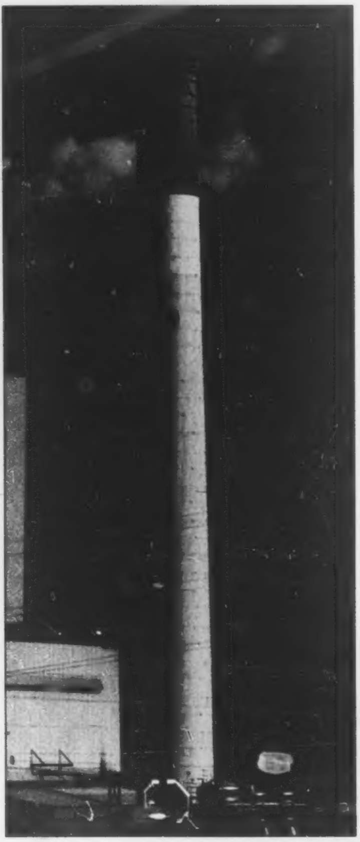

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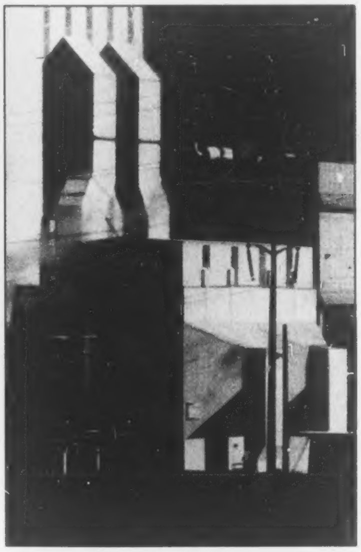

THE COVER

This issue's focus on chemical recovery includes an in-depth analysis of the latest trends and developments in this vital area (p. 74), along with articles on specialized equipment applications in the recausticizing operation. **(Photo of Louisiana-Pacific's new recovery boiler and recovery island at Somoa, Calif., courtesy of Louisiana-Pacific and Ahlstrom Machinery.)**

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ABP

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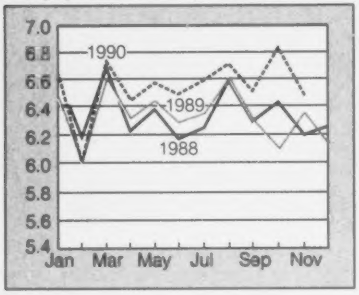
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.5 million tons in November, up 2.0% from a year earlier, according to the American Paper Institute. The seasonally adjusted rate of production stood at 78.4 million tpy, up 2.1% from last year. Paper production was up 2.9% over last year, more than twice the 1.3% gain posted for paperboard output. But API reports that paperboard has shown more strength than the paper sector since last summer, rising 2% above its rate for the first half of the year.

Among major grades, newsprint continued to show strong year-over-year growth thanks to newly installed paper machines, but consumption has recently trended downward in the U.S. market. Printing and writing shipments were up 3.2% over a year earlier, with unfilled orders relatively high for groundwood and uncoated free-sheet papers. Containerboard production for export was up 11.2%, but output for the much larger domestic market was only 1.9% ahead of the previous year.

Canadian newsprint shipments totaled 688,000 metric tons in November, down 15.7% from last year. Operating rates dropped to 81%, bringing the yearly rate to 90%. Woodpulp output totaled 652,000 tons, up 2.2%, with mills operating at 79%. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Nov.	564	9.3	6,587	8.7
Uncoated groundwood (s)	Nov.	153	0.0	1,770	0.1
Coated paper (s)	Nov.	606	-1.6	7,545	4.3
Uncoated free-sheet (s)	Nov.	943	1.4	11,544	3.6
Other printing/writing	Nov.	121	2.5	1,571	3.7
Total packaging and other paper (s)	Nov.	384	-10.5	4,646	-5.7
Tissue	Nov.	465	-1.9	5,788	2.5
Total paper	**Nov.**	**3,237**	**0.1**	**39,451**	**2.8**
Unbleached kraft paperboard	Nov.	1,716	8.6	20,246	3.6
Semichemical medium	Nov.	477	4.8	5,691	0.1
Bleached paperboard	Nov.	336	-11.3	4,376	-3.3
Recycled paperboard	Nov.	724	1.5	8,803	-0.4
Total paperboard	**Nov.**	**3,253**	**4.1**	**39,115**	**1.3**
Total U.S. paper and paperboard output	**Nov.**	**6,489**	**2.0**	**78,566**	**2.1**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Oct.	5,442	2.8	63,346	1.5
Market pulp production	Oct.	728	6.6	8,890	1.1
Wastepaper consumption at paper/board mills	Oct.	1,834	4.2	21,185	8.3
Pulpwood consumption (cords)	Oct.	8,517	2.2	99,572	0.7
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft^2)	Nov.	24.955	-1.6	294.392[6]	1.4
Containerboard inventories at U.S. box plants and mills	Nov. 1	2,485	1.0		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Oct.	1,149	-1.6	13,138	1.3
Imports of Canadian newsprint	Oct.	668	-10.0	8,217[6]	-1.5
U.S. paper exports (including products)	Oct.	576	4.0	8,860	8.3
Exports of unbleached kraft linerboard	Oct.	203	2.0	2,656	18.9
Exports of woodpulp	Oct.	491	-2.2	5,989	-5.8
Norscan pulp inventories[4]	Nov. 30	1,421	20.9		
Norscan pulp operating rates[4]	Nov.	82%	87%	76%	87%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Nov.	688	-15.7	8,334[6]	-5.2
Operating rates	Nov.	81%	97%	90%	96%
Inventories held by U.S. consumers	Nov. 30	n.a.	—		
Other paper/board shipments	Nov.	625	3.8	6,858	7.2
Woodpulp shipments (export only)	Nov.	652	2.2	6,988	-8.0
Operating rates	Nov.	79%	93%	84%	94%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Tissue: Firms push ahead on new capacity and manage to keep the price hikes coming

Grade structure: Tissue falls into two broad categories: sanitary and "other." Sanitary products predominate and include bathroom, facial, toweling, napkins, basestock for sanitary stock, wadding, and wipes. The "other" group, a mere 2% of the market, covers basestock for waxing, wrapping, and miscellaneous uses. The two major outlets for tissue are consumer and commercial and industrial (C&I). Consumer tissue accounts for 62% of the market and is purchased at retail outlets. Industrial tissue goes to hotels, offices, restaurants, factories, and institutions. Consumer tissue growth is expected to be half that of commercial products over the next few years. Typical basis weights for tissue include 12 to 14 lb/3,000 ft^2 for single-ply bathroom tissue and 32 to 39 lb/3,000 ft^2 for single-ply towel.

Production/capacity: The tissue industry is planning a flurry of new projects, though some analysts believe a few of the announcements are posturing by the industry. Among the potential projects is a new $200-million mill being planned by Scott Paper Co. on the Ohio River near Owensboro, Ky. Along with some other investments, this should release the firm from the need to buy tissue paper. Construction should begin in 1991.

Fort Howard Corp. expects a mid-1991 startup for a fourth tissue machine at its Savannah River mill in Rincon, Ga., raising the mill's 100%-recycled tissue capacity 30%, or 225 tpd. Output will find its way primarily to the C&I market. The company will also put $180 million into its Green Bay, Wis., tissue facility, expanding capacity by 20% by early 1993.

Potlatch Corp., which claims the premier position in private label and generic tissue products in the U.S., plans to start up a new tissue machine and shut down an old one at its Lewiston, Idaho, mill by 1992. The $95-million effort will bring mill capacity to 124,300 tpy, up from 85,700 tpy.

Kimberly-Clark Corp. introduced its first baby wipes product in fall 1990. The firm also put up a C&I tissue mill in Loudon, Tenn. And the firm's new Jenks, Okla., facility is being dedicated to K-C's re-entry into the U.S. consumer bath tissue market. The plant produces 68,000 metric tpy of consumer tissue.

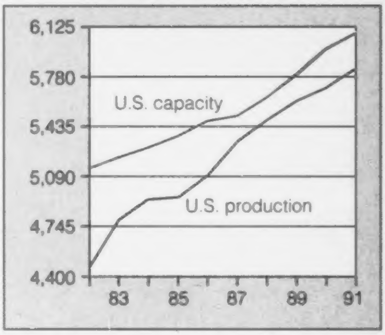
Procter & Gamble Co. is continuing its expansion in the consumer toilet tissue and paper towel market. It plans to pump about $250 million into two new paper machines at an existing P&G plant east of the Rockies. Engineering studies for the project should be complete by the end of 1991. The firm is also planning a $100-million tissue and towel expansion that could include a new machine in California, possibly in Oxnard.

Outlook: Slower economic growth will hold down gains in demand for both consumer and C&I tissue in 1991. The weakening economy could reshape demand, driving consumers to use lower-price tissue, hurting upscale producers. Private-label products also do better under these conditions. And people eat out less in an economic dip, damping the demand for C&I tissue.

On the whole, however, both the consumer market and the C&I business are quite stable now. Tissue firms realized a 3% or so price hike on consumer tissue by mid-1990, though the introduction of Kimberly-Clark's Kleenex bath tissue late in the summer led to some promotional activity in the South. The industry's 5% across-the-board price hike in away-from-home tissue planned for late fall was moving into place toward year end and will probably result in a 3% rise. In 1991, analysts expect overall tissue prices will go up 2% to 3%, including some carryover from last year's hikes and a possible rise in second-half 1991.

Prices: Because of the highly competitive market for consumer tissue paper, the price of tissue paper per ton is not readily available. Price trends tracked by the Bureau of Labor Statistics' Producer Price Index (PPI) show relative changes in price levels. Note that this is an index and not a dollar/ton price. The PPI for converted sanitary paper products, including unconverted stock is as follows (1982 = 100): 1981, 98.2; 1982, 100; 1983, 102.1; 1984, 103.4; 1985, 106.6; 1986, 108.1; 1987, 109.1; 1988, 115.0; 1989, 126.0; 1990 (November), 130.6.

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1989	1990e	1991e
Production	5,636	5,750	5,825
Capacity[1]	5,798	5,976	6,113
Utilization rate	97.2%	96.2%	95.3%
Imports[2]	121	120	120
Exports[2]	21	30	25
Apparent U.S. consumption	5,736	5,840	5,920
lb/capita	46.1	46.6	46.9
GNP ratio	1.39	1.40	1.41

e = estimate.

1. American Paper Institute data.

2. U.S. Dept. of Commerce data.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity	Market share (%)
1. Scott Paper	1,170	19.1
2. James River	1,110	18.2
3. Fort Howard	950	15.5
4. Procter & Gamble[1]	815	13.3
5. Georgia-Pacific	547	8.8
6. Kimberly-Clark	535	8.9
7. Chesapeake	190	3.1
8. Pope & Talbot	139	2.3
9. Orchids Paper	95	1.6
10. Marcal Paper Mills	88	1.4

Market share of top five companies:
75.1%

Market share of top ten companies:
92.2%

Total U.S. capacity (1991):
6.113 million short tons

1. estimate.

Celgar gets interim approval for expansion

Celgar Pulp Co. received mixed signals in an interim report issued Dec. 5 by the government panel reviewing its proposed C$630-million mill expansion at Castlegar, B.C. The project, announced in October 1989, has been undergoing a first-of-its-kind review by a three-member independent panel put together by both the federal and provincial governments in community and technical hearings since September. The project would double bleached kraft pulp capacity to around 420,000 metric tpy.

The mill suffers from a poor environmental record, in part because the British Columbian government has given it variance permits over the years. The panel has concentrated on air and water quality, woodchip supply sources, and the impact of greater truck traffic. The final report was due in mid-January and must be approved by both governments, although technically the project could go ahead based on this report.

Although the federal and British Columbian governments granted "approval in principle" for the project, the panel's final report will recommend "that strict terms and conditions be imposed by permitting authorities," general manager R. Wilf Sweeney quoted from the interim report. He said Celgar is unlikely to proceed with the project until the panel makes clear what needs to be done in the final report, even though Celgar believes the expanded mill will meet all environmental requirements. ■

CAPACITY SURVEY

U.S. paper capacity growth revised downward

	Additions 1991–93		Additions 1980–90	
	Three-year increase	Average annual growth	Ten-year increase	Average annual growth
Total all grades paper and paperboard	**7,503**	**2.8%**	**15,464**	**2.0%**
Total paper and paperboard	7,487	2.9	17,670	2.4
Total paper	3,711	2.8	9,552	2.6
Newsprint	602	2.9	1,992	3.5
Printing/writing	2,456	3.4	7,144	3.6
Packaging and industrial converting	189	1.1	(606)	(1.0)
Tissue	373	2.0	1,022	1.9
Total paperboard	3,776	2.9	8,118	2.2
Unbleached kraft	1,491	2.3	5,371	2.9
Solid bleached	670	4.6	439	1.0
Semichemical	226	1.3	899	1.7
Recycled	1,389	4.4	1,409	1.5
Construction grades	15	0.2	(2,206)	(6.8)
Total all grades woodpulp	**3,669**	**1.8%**	**11,002**	**1.8%**
Total woodpulp[1]	3,689	1.8	12,289	2.1
Dissolving and special alpha	3	0.1	(66)	(0.4)
Sulfite	(20)	(0.4)	(251)	(1.4)
Sulfate[2]	3,626	2.3	10,721	2.4
Semichemical	18	0.1	87	0.2
Mechanical	62	0.3	1,799	3.1
Construction paper and board	(20)	(1.0)	(1,287)	(9.8)

1. Excluding pulp for construction paper and board.
2. Includes screenings. ( ) =Decline.
Source: American Paper Institute.

Growth trends in U.S. capacity (000 short tons).

U.S. papermakers will increase manufacturing capacity for primary paper and paperboard by 7.5 million short tons during the next three years, according to the American Paper Institute's annual capacity survey. These capacity additions represent a 2.9% average annual growth rate during 1991-93. This rate is considerably lower than the 3.4% annual growth rate reported by producers last year, and the 1992 capacity level is now expected to be 1.7%, or 1.5 million tons, below the 1992 level reported in last year's survey. "Increasingly, uncertain economic prospects are resulting in delays, stretchouts, and cancellations of expansion projects," said API president Red Cavaney.

Although the results of API's thirty-third annual capacity survey signal a cutback in the recent boom in capital spending, capacity additions in 1991 alone will total 3.2 million tons, or 3.8%. This is the highest one-year rate of growth in industry capacity since 1973. Since these higher capacity additions in 1991 follow a two-year period when domestic production of paper and board increased by only 2.5% during 1989-90, there is considerable concern that industry operating rates will fall sharply next year. Total industry paper and board capacity is expected to reach 84.0 million tons this year, 87.2 million tons in 1991, 89.5 million tons in 1992, and 91.5 million tons in 1993.

Newprint capacity growth. Newsprint capacity will increase 532,000 tons, or 8.4%, this year as new production from four new paper machines that started up in the 1989-90 period enters the market. This one-year increase exceeds all gains in newsprint capacity over the previous six years and will raise total industry capacity to 6.8 million tons in 1990. Capacity additions for printing/writing paper grades have been revised slightly downward for the second time. Following a below-trend 1.3% capacity increase for printing/writing paper in 1990, capacity growth will average 3.4% yearly in 1991-93. Five new paper machines that will produce uncoated and coated free-sheet grades are scheduled to be brought online. The demand growth for uncoated grades has been stimulated by the growing use of copiers and personal computers, but demand for coated paper for publishing and advertising has softened. In contrast to the free-sheet grades, capacity gains for uncoated and coated groundwood paper will come from rebuilding or upgrading existing machines. Uncoated groundwood capacity will remain virtually unchanged, while coated groundwood capacity will increase by only 1.7% annually in the 1991-93 period.

After a 3.1% tissue capacity increase in 1990, producers plan to add 373,000 tons of new capacity during 1991-93. These additions will yield a 2.0% annual growth rate, continuing a long-term growth trend that has averaged 1.9% annually over the last ten years.

Kraft linerboard: moderate gains. During the next three years, capacity for all containerboard grades (including recycled grades) will increase by 2.5 million tons, resulting in an annual rate of increase averaging 2.8%. However, capacity for kraft linerboard will increase at a lower rate of 1.9%. Gaylord Container Corp. started up a new kraft linerboard machine in 1990, but no other new kraft linerboard machines are scheduled to come online following Union Camp Corp.'s startup of a new machine in 1991. Recycled linerboard currently accounts for only 458,000 tons, or 2.3%, of total 1990 linerboard capacity. From this small base, capacity for recycled linerboard is expected to increase at an annual rate of 39% to reach 1.4 million tons in 1993. Recycled corrugating medium will increase at a lower 2.5% annual rate to reach 2.4 million annual tons in 1993.

Total woodpulp capacity will expand at lower rates than for many paper and board grades over the next three years because wastepaper use is expected to rise sharply. Industry capacity for woodpulp is projected to increase at an annual rate of 1.8%, reaching 69.2 million tons in 1993.

Market pulp capacity is growing at near-record levels as new production from Stone Container Corp., Weyerhaeuser Co., Union Camp, and Alabama Pine Pulp Co. comes on line. Capacity for bleached sulfate market pulp, which comprises nearly 80% of all market grades, will increase 5.2% annually, from 7.4 million tons in 1990 to 8.7 million tons in 1993.

Copies of API's 1990 capacity survey are available for $350 each in the U.S. and $375 overseas from Dept. CMS, American Paper Institute, 260 Madison Avenue, New York, N.Y. 10016. Phone: (212) 340-0600. Fax: (212) 689-2628. ■

LABOR

Canadian contract bargaining winds down

Operations resumed at Canadian Pacific Forest Products Ltd.'s newsprint mills in Thunder Bay, Ont., Gatineau, Que., and Dalhousie, N.B., following the holiday ratifications of three-year contracts modeled after the Canadian Paperworkers Union's pattern contract with Stone-Consolidated Inc. Over 3,000 striking CPU members returned to work at the CPFP mills after about four months, ending a tumultuous season of labor bargaining in eastern Canada that began in April when the previous contract covering about 35,000 industry workers expired. Negotiations are about 95% completed, CPU president Don Holder said.

While CPFP mills resumed operations, they had not reached full production as of Jan. 11 because the company did not have a full backlog of orders awaiting startup, a spokesman said. CPFP is a major supplier of newsprint to eastern U.S. publishers, and the industry continued speculation as to whether the end of the strikes would signal doom to the Jan. 1 newsprint price hike. Observers said when the mills return to full production, producers will likely have to offer increased discounts from the list price or formally roll back the price increase. Several CPU strikes in the summer and fall helped a 5% June 1 price hike succeed. At one point, 23% of Canadian newsprint capacity was idled in strikes at 11 mills, tightening supplies but not causing any shortages.

Despite the long strike at CPFP, the new contract closely resembles the pattern agreement reached in July at Stone's St. Maurice Valley mills rather than the one concluded with Abitibi-Price Inc. in October after a major disruption at seven of the company's mills. The CPFP agreement provides the company with greater flexibility in assigning work to tradesmen and allows it to operate its mills on two previous statutory holidays without union consent. Abitibi's contract requires union consent to run the mills on New Year's Day and Labor Day.

Neither side in the dispute at CPFP would comment on root problems in negotiations, but CPU's Holder said the union anticipated finding "the middle of the road" following variations established between the Stone pattern and the Abitibi contract regarding the contentious issues. The CPFP contract was approved by over 80% of workers at Gatineau and Dalhousie but by only about 63% at Thunder Bay.

"You never have 100% satisfaction," Holder said. He added that in several of the strikes in 1990, company management refused to deal effectively with the issues of holidays and flexibility.

"What took place this year, took place on local issues," Holder continued. "Our industry in the '80s had fair and just settlements, and we expect it to continue in the '90s."

Meanwhile, production restarted Dec. 18 at Quebec & Ontario Paper Co.'s Thorold, Ont., 310,000-tpy recycled newsprint mill following the end of a four-month strike by 500 CPU workers. The mill was expected to reach full capacity early in January following the Christmas shutdown, a company spokesman said.

Stone-Consolidated said that negotiations with CPU at the New Richmond, Que., kraft linerboard mill were to resume Jan. 22, 1991, while talks at the Bathurst, N.B., complex would begin Feb. 11. Approximately 400 CPU members are employed at the Bathurst mills, which produce corrugating medium and newsprint-grade chemi-thermomechanical pulp.

UPIU achieves settlements. As of early January, the United Paperworkers International Union (UPIU) had reached agreement at all but one of the Canadian mills where it represents workers. Settlements were reached earlier at the Abitibi-Price Inc. newsprint mill in Pine Falls, Man., James River Corp. in Marathon, Ont., and Kimberly-Clark Corp. in Terrace Bay, Ont. A UPIU vice president in Wisconsin said that Canadian UPIU members received the basic pattern agreement wage hike "and a little bit better." Details on the contracts were not available, but the vice president said those mills achieved slightly different provisions regarding flexibility and holiday operations.

"We feel very positive with what we accomplished there," said Ed Windorff, vice president of UPIU Region 10. ■

Greenfield Mill Site Permitting Can Take Years of Preparation

New and proposed land, water, and air regulations are reviewed against a mill case history backdrop

By ROBERT B. KINSTREY

Several years ago, all that was required to site a greenfield mill was land (at least 200 acres for a 1,000-tpd kraft mill), water, access to railroad and highway, and perhaps a nearby electric transmission line. It was also helpful to have some political pull when negotiating items such as incentives, tax breaks, and building and environmental permits. Today it is a whole different story. Things that were taken for granted, such as land, are now tangled in an environmental briar patch.

Optec, Rust International's consulting engineering group, has been involved in the preliminary permitting of a 1,000-plus-tpd bleach kraft mill in the northern U.S. Since the location of the new mill is geographically limited by existing production facilities and woodlands, one might think the preliminary phase of site selection and fatal-flaw analysis would take about six months. This has not been the case. Eight months later, we are about halfway through the preliminary phase and envision that the full permitting process may take three to five years.

Table 1 outlines some of the major issues to be addressed during the preliminary phase. Many items on the list are self-explanatory and require no further discussion. I will, however, discuss those items that have either received recent public attention or caused us unforeseen headaches.

LAND. As mentioned, land choice has become a real thorn in our side. Section 404 of the Clean Water Act, Section 10 and Section 404 of the Rivers and Harbors Act of 1899, the Fish and Wildlife Coordination Act, and the "Swamp Buster" provision of the Food Security Act of 1985 give the Environmental Protection Agency (EPA), the Army Corps of Engineers (CE), the Fish & Wildlife Service (FWS), and the Soil Conservation Service (SCS) the responsibility for identifying and protecting wetlands. All four agencies have recently col-

TABLE 1: **Typical land, air, and water permitting for a greenfield kraft mill.**

Land	Air	Water
Solid waste disposal facility	Air quality (PSD[1] increments)	Baseline data • Water quality • Aquatic species
Wetland protection	Baseline conditions/data • Meteorological • Ambient air	Dioxin discharge
Chemical storage and spill protection	Stack height	Chloroform discharge
Dioxin in sludge	NSPS[2] - Subpart Bb • Recovery boiler NSPS - Subpart Dd • Industrial boiler	TOCL/AOX discharge
Site location issues: • Road/traffic • Water vapor • Water supply • Runoff control • Drainage control • Storm water management • Soils • Wastewater disposal • Ground water protection • Buffers • Historic sites • Unusual natural areas • Wildlife/fisheries • Scenic impact • Flooding • Open space • Odor • Erosion control • Sunlight — can't block solar collecters • Wood supply	Emissions • Particulate • SO_2 • NO_x • VOC • TRS • CO • H_2SO_4 • VE	Metal discharge
	"Top Down" BACT	Priority pollutants
	Visibility impairment	Toxic hot spots
	Issues related to local park and recreational facilities	Bioassay requirements
	Emission source inventory	Antidegradation: • Color • Foam • Odor • River classification • Thermal limits • Protected river • NSPS/NEPA[3] • Water requirements • Treatment technology • BACT and NSPS • Indian issues • Spill collection/containment
	Clean air amendments	
	Chlorine emissions/limits	
	Toxic air pollutants	

1. Prevention of Significant Deterioration
2. New Source Performance Standards.
3. National Environmental Protection Act.

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laborated and produced a common document that defines a wetland. Criteria for a "wetland" are shown in Table 2.

Think about the location of most paper mills and their proximity to bodies of water. Now think about wetlands. Most people envision a wetland as a large swamp, marsh, or bog. However, by today's definition, almost the entire state of Alaska is a wetland, as are major portions of most northern states.

What has changed? In recent years, various lawsuits have caused EPA to broaden its responsibility under the Clean Water Act to include all waters of the U.S., not just the navigable waters. EPA also has veto power over the Corps of Engineers' issuance of permits for filling and dredging. As such, it has become the lead agency in protecting wetlands. In the past, the Corps of Engineers was fairly liberal in its policies of issuing permits for filling and dredging.

Now, because of increased recognition of how environmentally sensitive wetlands are and their importance in the global scheme, including the greenhouse effect, EPA and state agencies have become very inflexible when it comes to destroying wetlands. They steadfastly stand by their policy of no net loss. In the past, it was possible to show there were no other sites and that filling a "wetland" was the best economical alternative.

When the Tombigbee Waterway was built, it was understood that any wetlands destroyed by the new waterway would be replaced by building new wetlands. However, funding to build the new wetlands has not been approved. Some agencies do not even consider the replacement of wetlands an alternative. This makes it difficult to find enough land, especially contiguous land, to build a new mill. The wetland issue is a relatively new problem, and, as such, policies are still evolving and require a close watch.

WATER. The public consensus is that paper mills require large quantities of water and discharge "used process water" that contains total suspended solids (TSS), five-day biological oxygen demand (BOD_5), and other "pollutants" into local bodies of water.

A modern paper mill uses about 85% less water than it did 30 years ago. Tables 3 through 5 show how process

TABLE 2: **Wetlands.**

Wetlands possess three essential characteristics:

1. **Hydrophic vegetation —**
   Macrophytic plant life growing in water, soil, or substrate that is at least partially deficient in oxygen as a result of excess water content.
2. **Hydric soils —**
   Soils that are saturated, flooded, or ponded long enough (one to four weeks) during the growing season to develop anaerobic conditions.
3. **Wetland hydrology —**
   Permanent or periodic inundation or soil saturation to the surface, at least seasonally, are the driving forces behind wetland formation.

TABLE 3: **Integrated kraft mill wastewater discharge, gal/ton product.**

Technology	Bleached	Unbleached
1964 — older	110,000	90,000
1964 — current	45,000	27,000
1964 — new	25,000	16,000
1990 — design	16,000	8,000
% reduction — 1964 older vs 1990	85%	91%

TABLE 4: **Integrated kraft mill TSS waste load, lb/ton product.**

Technology	Bleached	Unbleached
1964 — older	200	170
1964 — current	170	130
1964 — new	90	80
1990 — design	50	45
% reduction — 1964 older vs 1990	75%	73%
Discharge to receiving water at 90% reduction in waste treatment plant	5	

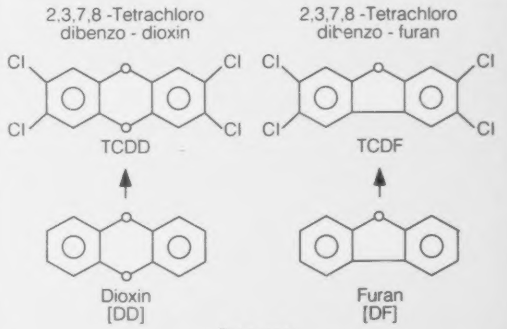
TABLE 5: **Integrated kraft mill BOD_5 waste load, lb/ton product.**

Technology	Bleached	Unbleached
1964 — older	200	160
1964 — current	120	90
1964 — new	90	80
1990 — design	60	50
% reduction — 1964 older vs 1990	70%	69%
Discharge to receiving water at 95% reduction in waste treatment plant	3	

TABLE 6: **Water consumption by grade, gal/machine-dried ton (MDT).**

	Unbleached kraft	Bleached kraft	NSSC	TMP
Pulp mill	7,000	7,000	2,600	2,500
Bleach plant		7,000		
	Kraft sack	**Fine**	**Corrugating medium**	**Newsprint**
Paper mill	3,000	7,000	4,000	6,000
Total	10,000	21,000	6,600	8,500

FIGURE 1: **Major path for TCDD/TCDF.**


2,3,7,8 -Tetrachloro dibenzo - dioxin
2,3,7,8 -Tetrachloro dibenzo - furan
Cl
Cl
Cl
Cl
Cl
Cl
Cl
Cl
TCDD
TCDF
Dioxin [DD]
Furan [DF]

Precursor
major path for TCDD/TCDF

improvements and "closing up" of mills have reduced the wastewater and waste-load quantities. The 1964 data are from the 1967 Paper Mills Industry Waste Water Profile prepared by the Federal Water Pollution Control Administration.

Today, BOD_5 and TSS discharged into the local receiving stream is less than 5 lb/ton of product. This is below the Federal Regulation 40 CFR Part 430 effluent guideline for new sources. Table 6 shows water consumption currently used by several more popular pulping processes.

Hardly anyone knew the word dioxin five years ago, but today it is a household word. Following is a brief history:

- 1985—2,3,7,8 TCDD (tetrachloro dibenzo dioxin) was found in fish downstream from a paper mill and subsequently found in mill effluent.
- 1988—National Council of the Paper Industry for Air & Stream Improvement (NCASI) reported on a five-mill study that showed TCDD and TCDF (tetrachloro dibenzo furan) were formed in bleaching operations.
- March 1988—PAPRICAN (Pulp & Paper Research Institute of Canada) reported finding precursors DBF (dibenzo furan) and DBD (dibenzo dioxin) in defoamers and oil.

Figure 1 shows the major path for the creation of the tetrachlorinated products from the nontoxic precursors.

Dioxin is a potent carcinogen in rats. It accumulates in the fatty tissues of animals. Thus, it can enter the human food chain. Levels detectable in pulp are measured in parts per trillion (ppt) and parts per quadrillion (ppq) in paper mill effluent. These numbers should be put in perspective:

- One ppt is equal to one pint of vermouth in 10 million gal of gin.
- One ppq is equal to one sec in 30 million years.

It is not known at what level dioxin affects human health.

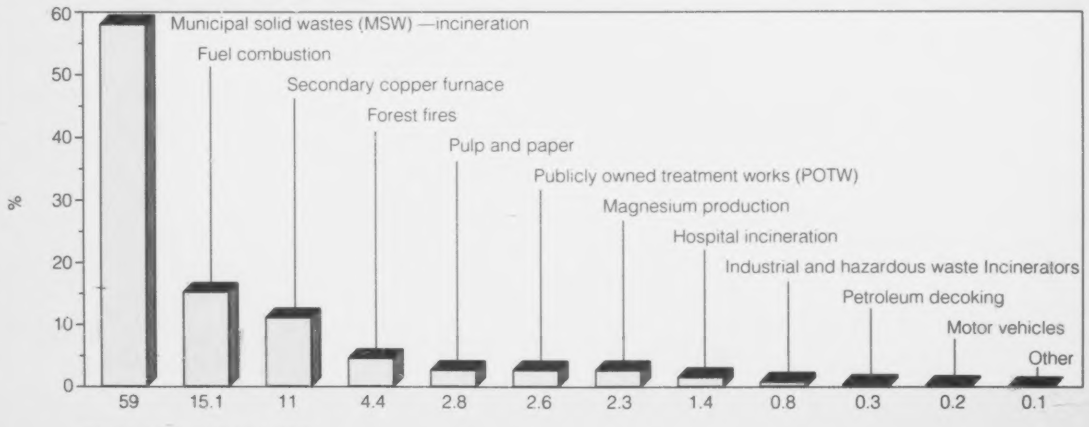
The paper industry is not the primary source of dioxin (Figure 2) but has gotten a lot of attention due to the efforts of groups such as Greenpeace. The total annual release in the U.S. is 88.5 lb. The paper industry releases 2.8 lb annually.

Shelly Stewart, Greenpeace's director of pulp and paper operations, stated at a recent Gulf Coast TAPPI meeting that Greenpeace targeted the paper industry because dioxin is a byproduct that no one cares about (i.e.,

TABLE 7: **AOX, TOCL, dioxin reduction plan.**

- Good chip preparation
  - — Chip thickness screening
  - — Chip bark content less than 0.7%
- In-digester extended delignification
- Brownstock screening with good shive removal
- Three stages brownstock pressure washing
  - — Entrains less air, thus less defoamer required
- Use of an O D_CE_{OP}D D bleach sequence
- Oxygen delignification followed by two stages of postoxygen washing
  - — Strips out precursors if operated above 100°C
  - — Lowers kappa number entering bleach plant, thereby lowering chlorine requirement
  - — Reduces liquor/defoamer carryover
- D_C stage
  - — 0.17 chlorine multiple
  - — 70% ClO_2 substitution
  - — Multiple ClO_2/Cl_2 injection points
- E_{OP} stage
  - — Reduces amount of chlorinated bleaching agents needed
- Two D stages
  - — More forgiving
  - — Reduces chemical consumption
- Sophisticated distribution control system
- Activated waste treatment system

FIGURE 2: **U.S. annual releases of dioxin. Total releases in total equivalents (TEQ)—40,134 (g/yr).**



Source: American Paper Institute.

the quantity is so small, why worry about it). This is part of what Greenpeace calls "a tyranny of small decisions." The accumulation of many micro actions will cause the demise of the world. Stewart would like to see the paper industry "chlorine free by '93."

A modern bleach kraft mill using the latest technology will produce effluent in which dioxin will be nondetectable. However, controlling dioxin alone will not solve the problem of chlorinated byproducts in the effluent. Many countries, such as Sweden, are taking steps to control total organic chlorides (TOCL) and absorbable organic halogens (AOX). Controlling TOCL and AOX will also control dioxins. Processes used to control AOX, TOCL, and dioxin are shown in Table 7.

Figure 3 shows the combined effects of high chlorine dioxin substitution and a low chlorine multiple (chlorine multiple is equal to the percent of active chlorine on an oven-dry pulp basis, divided by the kappa number entering the bleach plant).

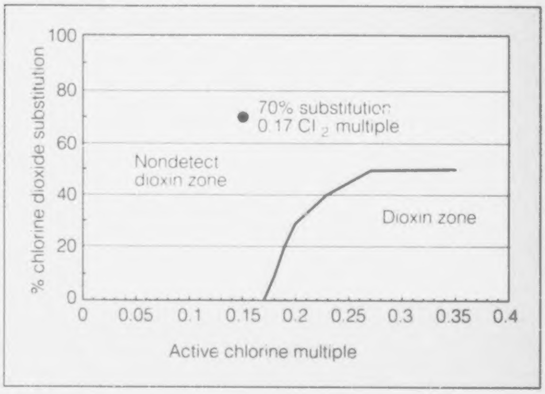
Color is emerging as the next hot issue. Maine has recently promulgated legislation to limit color from new sources to 75 lb/ton and from existing sources to 150 lb/ton. Modern bleach plants for softwood pulps will have a difficult time meeting these limits. Even employing all the latest technology for plant processing, expensive end-of-pipe treatment, polymer addition to secondary clarifiers, and/or air flotation cells may have to be used.

TABLE 8: **Summary of air emission limits.**

Emissions site	Pollutant	Projected lowest emissions limit	Status
Recovery furnace	PM/PM10	0.021 gr/dscf[1] @ 8% O_2	achievable
	VE	20% opacity	achievable
	TRS	5 ppm @ 10% O_2	achievable
	SO_2	100 ppmdv[2] @ 8% O_2	achievable
	NO_x	100 ppmdv @ 8% O_2	achievable
	CO	169 ppmdv @ 8% O_2	demonstrated @ 250 ppmdv @ 8% O_2
	VOC	6.8 ppmdv @ 8% O_2	demonstrated @ 75 ppmdv @ 8% O_2
	H_2SO_4	62 ppmdv @ 8% O_2	achievable
Wood waste boiler	PM/PM10	0.03 lb/mm Btu	achievable
	VE	20% opacity	achievable
	SO_2	0.27 lb/mm Btu	achievable
	NO_x	0.15 lb/mm Btu	achievable
	CO	0.4 lb/mm Btu	achievable
	VOC	0.010 lb/mm Btu	achievable
Lime kiln	PM	0.1 gr/dscf @ 8% O_2	achievable
	VE	20% cpacity	achievable
	TRS	5 ppm @ 10% O_2	achievable
	SO_2	90 ppmdv @ 10% O_2	achievable
	NO_x	250 pprndv @ 10% O_2	demonstrated @ 310 ppmdv @ 8% O_2
	CO	155 ppmdv @ 10% O_2	achievable
	VOC	1 lb/ton CaO	achievable
Smelt dis tank	PM/PM10	0.127 lb/ton BLS	achievable
	VE	20% opacity	achievable
	TRS	0.033 lb/ton BLS	achievable
	SO_2	0.067 lb/ton BLS	achievable

1. Grains/dry standard ft^3.
2. ppm dry volume.

FIGURE 3: **Chlorine dioxide substitution vs active chlorine multiple.**



AIR. Tell someone that a kraft mill is going to be built in their town and one of the first comments will be, "Why do we want one of those smelly things built here?" Today, a modern mill is essentially odor free. Odor from mills like Leaf River Forest Products Inc. in New Augusta, Miss., or Union Camp Corp. in Eastover, S.C., cannot be detected at the property line—unlike older mills from which odor can be detected while traveling on an interstate highway 20 miles away. Eliminating odors from a kraft mill is the result of process changes. There are primarily four of them: 1) installation of TRS (total reduced sulfur) gas collection and incineration systems, 2) installation of the low-odor recovery boilers in which the direct contact cascade evaporator using fluegas to thicken the black liquor has been replaced with concentrators that use steam, 3) oxidizing lime mud prior to calcining, and 4) the use of spill monitoring and collecting systems. The latter minimizes odor released from the waste treatment system and also BOD_5.

Emission limits from the various combustion units in use at a paper mill have been reduced through the years as the technology has advanced. Best available control technology (BACT) results in the extremely low limits shown in Table 8. Electrostatic precipitators are being used for all sources, and some also use scrubbers. Some waste-fuel boilers are now injecting either ammonia or urea into the fluegases prior to release to control NO_x by selective noncatalytic reduction (SNCR).

Visible emissions released from mills are a concern in many states. The most visible emissions are water vapor plumes from cooling towers and paper machine hood exhaust fans. In the future, you may see reheating equipment installed to minimize these plumes.

OTHER REQUIREMENTS. Tables 9 through 11 show some of the other process requirements, e.g., wood, electric power, and steam from various paper mill configurations. Kraft mills are essentially self-sufficient, in that the steam and electricity generated by the burning of black liquor, bark, and sludge is more than enough to produce the pulp. Additional fossil fuels would have to be consumed to generate enough power to convert the pulp to a final product. Groundwood operations, on the other hand, require substantially higher quantities of electric power.

Another example of how kraft mills have reduced their impact on the environment is the reduction in lime kiln fuel use. Several years ago, most kilns used in excess of 10 million Btu/ton. Today, new kilns use about 5 million Btu/ton. Tomorrow, 4.54 million Btu/ton may be possible if the vertical calciner currently under construction works. ■

TABLE 9: **Wood required.**

	Cords/MDT	Acres/day[1]
TMP	.95	27
High yield kraft	1.6	46
Bleached kraft	2.4	69

[1] For 1,000 MDtpd mill, 20 yr plantation yield 35 cords/acre

TABLE 10: **Electric power consumed by grade, kW/MDT.**

	Unbleached kraft	Bleached kraft	NSSC	TMP
Pulp mill	235	400	400	2,000
Bleach plant		150		
	Kraft sack	**Fine**	**Corrugating medium**	**Newsprint**
Paper mill	750	800	450	500
Total	985	1,350	850	2,500

TABLE 11: **Steam consumed by grade, lb/MDT.**

	Unbleached kraft	Bleached kraft	NSSC	TMP
Pulp mill	8,000	10,000	8,000	335
Bleach plant		5,000		
	Kraft sack	**Fine**	**Corrugating medium**	**Newsprint**
Paper mill	8,800	8,575	8,000	7,100
Total	16,800	23,575	16,000	7,435

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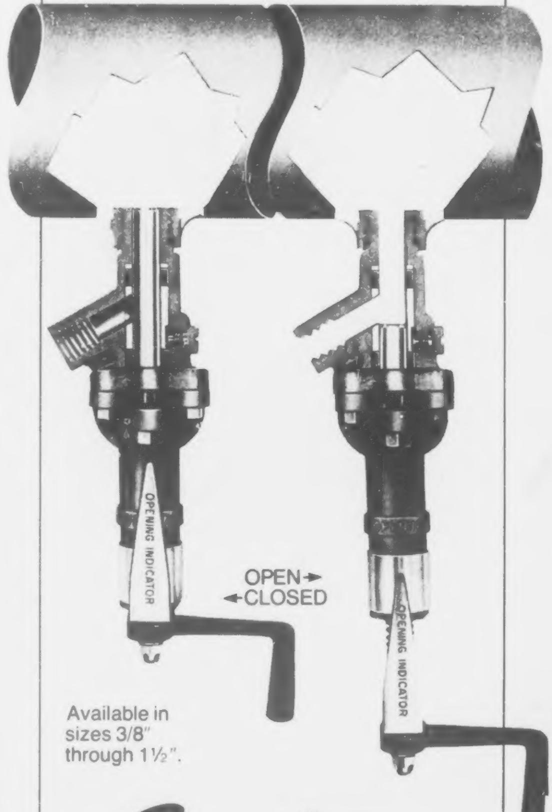

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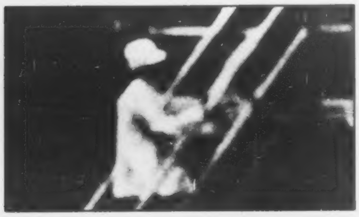

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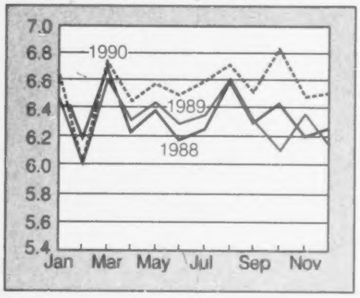
ABP

BPA

MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.5 million tons in December, up 5.8% from a year earlier, according to the American Paper Institute, bringing the total for 1990 to a record 78.6 million tons, an increase of 2.4% over 1989. Paper production outpaced paperboard all year long, finishing the year up 3.0% to 39.4 million tons. The peak months for paper production were July through October, when mills produced at an annual rate of 39.8 million tpy, API reported. In contrast to paper, paperboard strengthened at the end of the year, raising total output to 39.2 million tons, up 1.8% from 1989.

Among major grades, newsprint showed strong year-over-year growth thanks to newly installed paper machines, but downward trending consumption cut into output late in the year. Printing and writing paper finished the year up 3.5% over 1989 to a record 22.4 million tons, despite weakness in December.

Canadian newsprint shipments totaled 740,000 metric tons in December, bringing the yearly total to 9.1 million tons. Operating rates dropped to 86%, bringing the yearly rate to 90%. Woodpulp shipments dropped 8% for the year to 7.7 million tons, with operating rates dropping to 84% of capacity. ■

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	Dec.	576	8.3	6,615	8.7
Uncoated groundwood (s)	Dec.	147	19.5	1,768	1.4
Coated paper (s)	Dec.	564	-3.6	7,521	4.2
Uncoated free-sheet (s)	Dec.	930	7.6	11,510	3.9
Other printing/writing	Dec.	121	8.0	1,583	6.0
Total packaging and other paper (s)	Dec.	359	-10.7	4,611	-6.2
Tissue	Dec.	484	5.2	5,802	2.9
Total paper	**Dec.**	**3,183**	**3.4**	**39,410**	**3.0**
Unbleached kraft paperboard	Dec.	1,795	14.5	20,335	4.3
Semichemical medium	Dec.	494	2.9	5,710	0.3
Bleached paperboard	Dec.	369	-0.8	4,380	-3.1
Recycled paperboard	Dec.	683	4.8	8,731	-0.3
Total paperboard	**Dec.**	**3,321**	**8.1**	**39,156**	**1.8**
Total U.S. paper and paperboard output	**Dec.**	**6,504**	**5.8**	**78,566**	**2.4**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	Nov.	5,150	2.6	63,205	1.6
Market pulp production	Nov.	674	-2.2	8,817	0.8
Wastepaper consumption at paper/board mills	Nov.	1,790	6.9	21,212	8.4
Pulpwood consumption (cords)	Nov.	8,120	0.6	99,379	0.7
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	Dec.	21.412	-7.7	315.775[6]	0.8
Containerboard inventories at U.S. box plants and mills	Dec. 1	2,526	3.1		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	Nov.	1,090	-0.9	13,111	1.0
Imports of Canadian newsprint	Nov.	668	-5.8	8,187[6]	-2.0
U.S. paper exports (including products)	Nov.	546	14.9	8,833	8.6
Exports of unbleached kraft linerboard	Nov.	174	10.8	2,604	18.2
Exports of woodpulp	Nov.	438	26.2	5,922	-3.9
Norscan pulp inventories[4]	Dec. 31	1,359	33.1		
Norscan pulp operating rates[4]	Dec.	82%	82%	87%	87%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	Dec.	740	-9.4	9,075[6]	-5.5
Operating rates	Dec.	86%	94%	90%	96%
Inventories held by U.S. consumers	Dec. 31	1,226	3.9		
Other paper/board shipments	Dec.	535	3.7	7,393	6.9
Woodpulp shipments (export only)	Dec.	660	-11.8	7,686	-7.9
Operating rates	Dec.	76%	84%	84%	93%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Coated free-sheet: Markets suffer from overcapacity, economic dubiety

Grade structure: Paper with less than 10% mechanical pulp is designated as coated free-sheet. The highest grades, Nos. 1 and 2, contain no mechanical pulp, though Nos. 3 and 4 may or may not contain some mechanical fiber.

Most coated free-sheet is coated two-side (C2S) paper used for magazines, catalogs, advertising brochures and inserts, and other commercial printing. Coated one-side (C1S) paper has remained about 13% of total coated free-sheet production. Most C1S paper is used for labels, with some used in books, commercial printing, business forms, envelopes, and converted products other than labels.

Nos. 1 and 2 generally range from 60 to 100 lb and Nos. 3 and 4 in basis weights of 25 to 90 lb. Some 85% of coated paper has a glossy surface, the rest, a combination of dull, matte, and embossed. Gloss finishes on the Gardner glossmeter are 45 or more for glossy, down to 25 for dull, and 20 or below for matte. Two-thirds of No. 1 is glossy, 25%, dull; No. 2 is 80% glossy and 16% dull; and No. 3 is almost two-thirds glossy, one-third matte, and about 3% dull. Embossed is less than 2% of any grade.

In 1990, No. 1 paper represented about 14% of U.S. coated free-sheet production. No. 2 was 19%, No. 3 about 28%, No. 4 about 18%, and No. 5 near 7%. Only a few Canadian mills produce coated free-sheet, primarily Abitibi-Price Inc.'s Provincial Papers in Thunder Bay, Ont., which is under threat of closing down. Repap Enterprises Corp. Inc. does have a swing machine in New Castle, N.B.

Production/capacity: U.S. capacity of coated free-sheet was due to rise almost 11% in 1991, to over 4 million tpy, and 9% in 1992, the American Paper Institute said. The following new projects came online in 1990-91: Champion International Corp.'s 265,000-tpy machine in Quinnesec, Mich.; Scott Paper Co.'s 215,000-tpy machine in Skowhegan, Maine, and 60,000-tpy speedup at Muskegon, Mich.; Consolidated Papers Inc.'s 212,000-tpy in Wisconsin Rapids, Wis.; and Westvaco Corp.'s 250,000-tpy coated conversion at Wickliffe, Ky.

Canadian capacity will increase 10% this year to 165,000 metric tpy and another 9% in 1992, the Canadian Pulp & Paper Assn. reported. Island Paper Mills Co.'s off-machine coater will add 83,000 short tpy at New Westminster, B.C., by 1994.

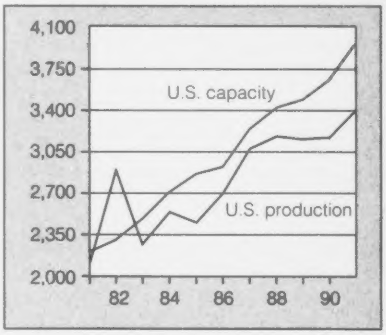
Outlook: No. 1 growth will be about 12%/year through 1998. No. 2 will increase coated market share to nearly 5%. No. 3 will grow 5.7% annually. Demand for No. 4 free-sheet will increase faster than for No. 4 groundwood. Nos. 1, 2, and 3 grades will experience strong growth. European producers have also entered the market; they currently supply about 8% of total U.S. demand for Nos. 1 and 2 and the superpremium grades.

Use of recycled fibers for coated free-sheet paper is still severely limited, though Westvaco Corp. has introduced a grade and another is possible from Simpson Paper Co.'s West Linn, Ore., mill.

Markets: Commercial printers used about 70% of coated free-sheet paper in 1990, followed at 12% by magazines, 11% for labels, 6% for books, and less than 1% each for business forms, other converting, and export. End uses include annual reports, catalogs, other advertising and promotional materials, and cover and interior pages of upscale magazines, with some used in coffee table books.

Prices: Historical pricing trends ($/short ton, average price for year) for coated free-sheet are as follows for 70-lb No. 1 sheets: 1986, $1,350; 1987, $1,410; 1988, $1,509; 1989, $1,614; 1990, $1,610. The following are historical prices for No. 3 rolls: 1986, $945; 1987, $980; 1988, $1,115; 1989, $1,258; 1990, $1,270. ■

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 tons)*

U.S.	1989[1]	1990[1]	1991e
Production[2]	3,155	3,157	3,409
Capacity[3]	3,503	3,638	4,023
Utilization rate	90.1%	86.8%	84.7%
Imports	235	276	288
Exports	51	77	85
Apparent U.S. consumption	3,339	3,356	3,612
lb/capita	27.00	26.85	28.61
GNP ratio (1982)	0.81	0.81	0.86

e = Estimate.
1. Revised.
2. *Pulp & Paper* estimates.
3. API.

TOP NORTH AMERICAN PRODUCERS

	Annual capacity (000 tons)	Market share (%)
1. Scott Paper[1,2]	1,100	26.2
2. Westavco[2,3]	590	14.0
3. Champion International	510	12.1
4. Mead	382	9.1
5. Consolidated Papers[2]	380	9.0
6. Repap Enterprises	334	7.9
7. Potlatch	310	7.4
8. Simpson Paper[2]	274	6.5
9. Noranda Forest	170	4.0
10. Abitibi-Price[4]	100	2.4

Market share of top five companies:
65.7%
Market share of top ten companies:
98.7%
North American capacity (1991):
4,205 million tons
Canada:
182,000 short tpy

1. S.D. Warren Div.
2. *Pulp & Paper* estimate.
3. Some potential coated capacity is unused.
4. Provincial Papers currently operates two machines.

ISSUE FOCUS: QUALITY CONTROL

Customer Demands, Tighter Markets Drive Mills' Quality Control Efforts

Survey of North American pulp and paper mills shows programs are in early stages, but most mills are involved in major improvement efforts

By KELLY H. FERGUSON, Projects Editor

Quality control—as defined by Deming, Juran, Crosby, et al.—seems to be taking hold in North American pulp and paper mills, even though most mills are in the early stages of implementation and are still battling to refine their programs and gain support from upper management. These quality programs, or "systems" as some mills refer to them, are being implemented at a time when most industry analysts say that competition in most markets is fierce and paper companies are beginning to sell to a global marketplace.

For companies selling in foreign markets, some type of quality system for the papermaking process may be necessary due to the integration of quality standards from various European countries into the ISO-9000 standards (see discussion, p. 59). Competition in the domestic markets is also helping push mills toward some type of structured quality program, which will improve process efficiency and product quality and enable them to provide customers proof of a superior product.

A *Pulp & Paper* survey of quality control practices shows that North American pulp and paper mills are seriously investing time and effort into quality control but are still in the early stages, as yet unable to involve mill operators 100%. It is at this level, quality "gurus" say, that the investment begins to pay off.

The *P&P* survey covered a wide range of North American mills: 25 U.S. states and six Canadian provinces; 15 grades of pulp, paper, and board; and tonnages from 26,000 tpy (smallest) to 882,000 tpy (largest). The respondents' titles were mostly in the quality control or technical area, although some mill general managers and process engineers responded.

INDUSTRY EMPHASIS ON QUALITY. Quality improvement and product consistency programs take various forms depending on the mill, its management, and its philosophy. A majority of responding mills (81%) said they have some type of active, ongoing quality program.

Of those mills that have implemented a quality program, many use a combination of methods on which to base their programs. Statistical process control/statistical quality control (SPC/SQC) (43.5%) and quality improvement teams (43.5%) are the methods most chosen. Total quality management (TQM) systems are used by 23%, and quality circles are used by 10%. Other methods employed include process tracking charts, databases for statistical analysis, and a Tennessee Associates International program termed "Managing for Consistency." Again, most mills use a combination of these programs; therefore, these percentages would not equal 100%.

Although quality control and improvement is certainly not new, pulp and paper mills seem to have just begun putting specific programs in place. Asked when their quality programs were implemented, most mills (44%) indicated the 1980s, and 17% said the 1990s. Only 4% said the 1970s. The other 35% either had no specific program or gave no date of implementation (Figure 1).

In developing their program or system, most mills take the initiative without the assistance of consultants or vendors—54% said they developed their program in-house only. Consultants do play a fairly major role in program development, though, usually in combination with mill personnel. Mill/consultant teams were used by 15% of the mills, and 6% of the programs were devel-

FIGURE 1: **Active, established quality control programs seem to just be catching on in the pulp and paper industry—most of the mills have implemented their programs in the last ten years, and most of those were in the latter part of the 1980s.**

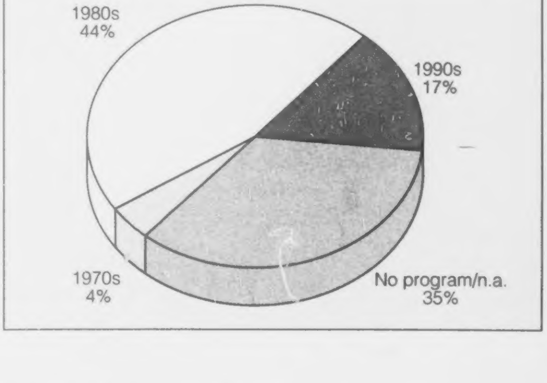
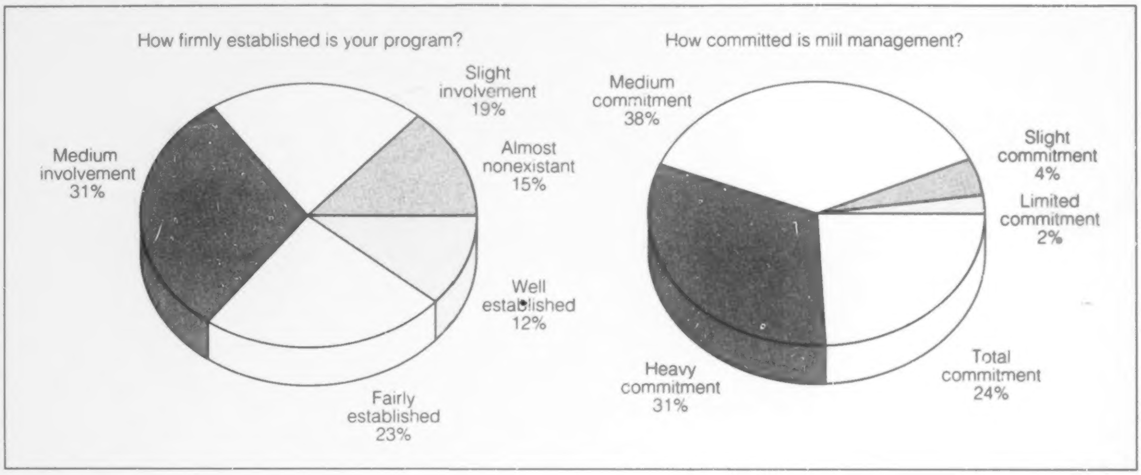


FIGURE 2: **Asked to rank their mills (on a scale of one to five) on how firmly established the quality programs are, respondents showed not only how new most programs were with indications of medium involvement but also that commitment from mill management is fairly high.**



oped by consultants only. Other programs were developed by various teams, including mill/corporate, mill/corporate/consultant, corporate, corporate/consultant, and mill/vendor.

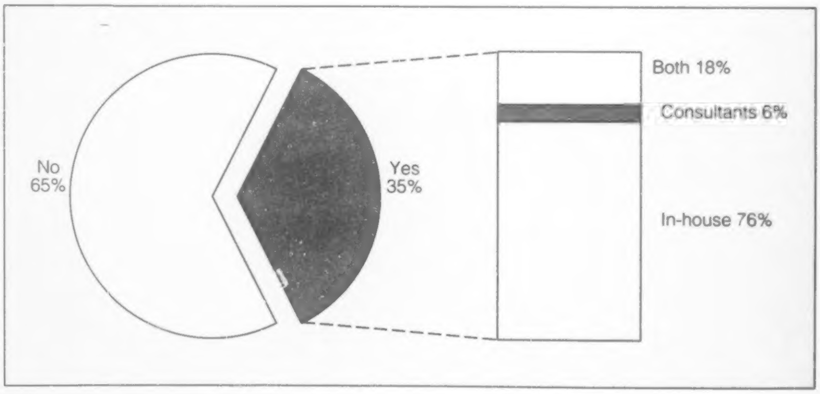
One of the best indicators of how a quality program will succeed at a mill is the support management gives the program as viewed by the mill employees. Respondents were asked first to rate how firmly established the quality program was at their mill. The rating was on a scale from one (almost nonexistent) to five (well established). The first chart in Figure 2 indicates that most respondents feel their program is fairly well established, even though most programs are relatively new—66% rated their mills as three, four, or five, and the largest rating (31%) was three, indicating only medium involvement, so far, by mills.

Respondents were then asked to rate the commitment of mill management to the program. Responses indicate a positive reaction from management, with 55% ranking commitment as a four or five (second chart of Figure 2). Very few mills (6%) ranked management commitment as very low.

In analyzing whether some manufacturers put more emphasis on quality than others because of the grade produced, the survey showed that the level of quality programs mostly depends on the mill or company. Printing/writing and specialty grades seem to put no more emphasis on quality than linerboard, containerboard, or corrugating medium. Even newsprint manufacturers, supposedly pushed by demands for higher brightness and better printability, did not necessarily have quality programs firmly established in their mills.

Many quality gurus say that one of the first steps in implementing a quality system is to adopt a written quality policy or statement. These statements are exemplified in slogans from such companies as Ford Motor

FIGURE 3: **Of the 35% of mills that have developed their own quality manual, most kept them site specific by handling in-house only.**



Co. ("Quality is Job 1"). Pulp and paper mills are fairly divided on how important a policy can be—48% said they have a written quality policy.

Because most mills are in the early stages of program development, only 35% said they have a written quality manual to guide their efforts. Figure 3 gives a breakdown of how those manuals were developed—76% by the mills, 6% by consultants, and 18% by mill/consultant teams.

One of the most telling signs of how far program implementation has progressed in mills is how involved mill operators are in the quality program (Figure 4). An overwhelming number of respondents (88%) rated operator involvement as "very important" (five on a scale of one to five). Another 10% rated it as "highly important" (a four rating). No mills rated the importance of operator involvement below a three.

But when asked to rate how involved their own mill operators are in the program, 45% rated it as only medium involvement (three) and 34% rated it as "limited involvement" or "slight involvement" (one or two).

QUALITY TOOLS AND PROGRAM EMPHASIS. As stated earlier, quality control takes different forms at different mills. The term "quality control" now means an emphasis on controlling and improving the process of pulping and papermaking. As part of their quality programs, mills are adding new and necessary tools to track raw material and machinery consistency. But this shift in emphasis is not replacing the final-product testing and inspection that has always been the industry's quality control.

End-product testing is used by 96% of the responding mills as a method for determining quality. However, newer, more advanced quality tools—vendor certification, SPC/SQC, etc.—are becoming standard practice in many mills, complementing the methods already in place (Figure 5). Some of the methods listed under the

Quality leaders

Competition is a driving force in all industries, and industry leaders set the standards for which others will strive. This is also true in quality control, but manufacturers in other industries also have set the example for many pulp and paper companies to develop quality control systems. The survey asked respondents first to name some of the quality leaders within the pulp and paper industry and then to name some quality leaders outside the industry.

Pulp and paper quality leaders:

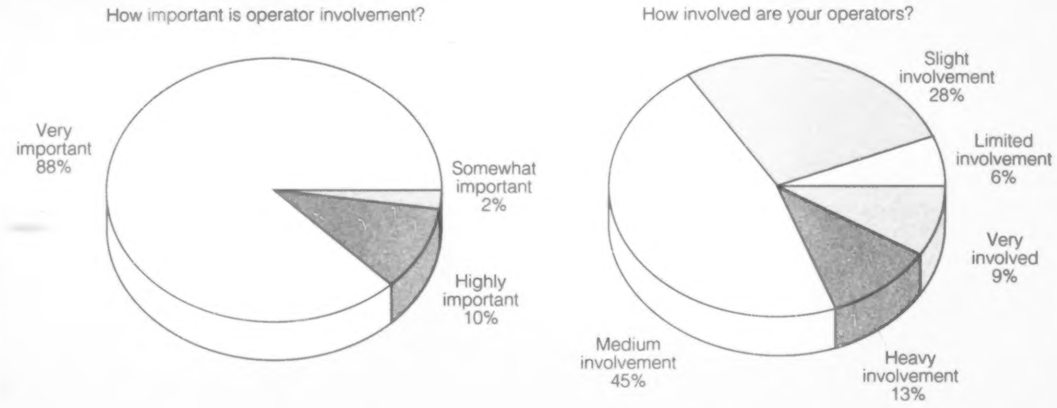
Champion International
Consolidated Papers Inc.
Daishowa Inc.
Dexter Corp.
Hammermill Papers
James River Corp.
Jefferson Smurfit Corp.
Kimberly-Clark Corp.
Kruger Inc.
Mead Corp.
North Pacific Paper Corp.
Packaging Corp. of America
Procter & Gamble Corp.
Repap Enterprises Corp. Inc.
S.D. Warren Co.
Union Camp Corp.
Westvaco Corp.
Weyerhaeuser Co.

Other quality leaders:

3M
Air Products
Allen-Bradley
AT&T
B.F. Goodrich
Black & Decker
Browning Arms & Sporting Goods
Cadillac[1]
Cargill
Dow
Dunlop Tires
Du pont
Engelhard
Federal Express[1]
Ford
General Electric
General Motors
Harley Davidson
Hewlett Packard
Honda
IBM[1]
J.M. Huber
Kodak
London Fog
Lorentzen & Wettre
Martin Marietta
Milliken[1]
Motorola[1]
Nalco
Nissan
Rohm & Haas
See's Candies
Supra Boats
Tennessee Eastman
Toyota
Wal-Mart
Westinghouse Nuclear Fuels Div.[1]
Xerox Corp.[1]

1. Indicates Malcolm Baldrige National Quality Award winners.

FIGURE 4: **Operator involvement in the quality program ranks as very important with an overwhelming majority of mills, but those mills are struggling to get their operators into the program.**



Quality control reading list

Survey respondents listed numerous books and reading materials that aided them in guiding their quality control efforts. The following is a reading list of those books that are still in print, and many can be found in local libraries or bookstores.

Amsden, Robert T., et al., *SPC Simplified,* Quality Resources: White Plains, N.Y., 1986.

Aubrey, Charles A. II and Felkins, Patricia K., *Teamwork: Involving People in Quality and Productivity Improvement,* Quality Resources: White Plains, N.Y., 1988.

Bird, Frank E. Jr. and Germain, George L., *Commitment,* Institute Publishing, a div. of International Loss Control Institute: Loganville, Ga., 1988.

Box, George E. and Draper, Norman R., *Evolutionary Operation: A Statistical Method for Process Improvement,* John Wiley & Sons: New York, N.Y., 1969.

Chase, R.S., editor, *Total Quality Management,* Springer-Verlag: New York, N.Y., 1988.

Crosby, Philip B., *Quality Without Tears: The Art of Hassle-Free Management,* New American Library: New York, N.Y., 1985.

Daniels, Aubrey C. and Rosen, Theodore A., *Performance Management: Improving Quality and Productivity Through Positive Reinforcement,* Performance Management Publ.: Tucker, Ga., 1983.

Deming, W.E., *Quality, Productivity, and Competitive Position,* MIT, Center for Advanced Engineering Study: Cambridge, Mass., 1982.

Deming, W.E., *Out of the Crisis,* MIT, Center for Advanced Engineering Study: Cambridge, Mass., 1986.

Ernst & Whinney Quality Improvement Consulting Group Staff, *Total Quality: An Executive's Guide for the 1990s,* Dow Jones-Irwin: Homewood, Ill., 1989.

Feigenbaum, Armand V., *Total Quality Control,* 3rd ed., McGraw-Hill: New York, N.Y., 1983.

Gitlow, et al., *Tools and Methods for the Improvement of Quality,* Richard D. Irwin Inc.: Homewood, Ill., 1988.

Gitlow, H.S. and Gitlow, S.J., *The Deming Guide to Achieving Quality and Competitive Postion,* Prentice Hall: Englewood Cliffs, N.J., 1986.

Goldratt, Eliyahu M. and Cox, Jeff, *The Goal: A Process of Ongoing Improvement,* North River Press: Croton-on-Hudson, N.Y., 1987.

Grant, Eugene L., and Leavenworth, Richard S., *Statistical Quality Control,* 5th ed., McGraw-Hill: New York, N.Y., 1980.

Guaspari, John, *The Customer Connection: Quality for the Rest of Us,* AMACOM: New York, N.Y., 1988.

Imai, Masaaki, *Kaizen: Key to Japan,* McGraw-Hill: New York, N.Y., 1989.

Ishikawa, Dr. Kaoru, *Guide to Quality Control,* 2nd ed., Quality Resources: White Plains, N.Y., 1986.

Juran, J.M., editor, *Quality Control Handboook,* 4th ed., McGraw-Hill: New York, N.Y., 1988.

Oakland, J.S., editor, *Total Quality Management,* Springer-Verlag: New York, N.Y., 1990.

Peters, Thomas J. and Waterman, Robert H. Jr., *In Search of Excellence: Lessons from America's Best Run Companies,* Warner Books: New York, N.Y., 1988.

Peters, Tom, *Thriving on Chaos: Handbook for a Management Revolution,* Harper & Row: New York, N.Y., 1988.

Rogers, Buck and Levey, Irv., *Getting the Best Out of Yourself and Others,* Harper & Row: New York, N.Y., 1988.

Scherkenbach, W.W., *The Deming Route to Quality and Productivity: Road Maps and Roadblocks,* CeePress Books: Washington, D.C., 1986.

Scholtes, Peter R., *Team Handbook: How to Use Teams to Improve Quality,* 2nd ed., Joiner Assoc.: Madison, Wis., 1988.

Wheeler, Donald J. and Chambers, David S., *Understanding Statistical Process Control,* Statistical Process Controls Inc.: Knoxville, Tenn., 1986.

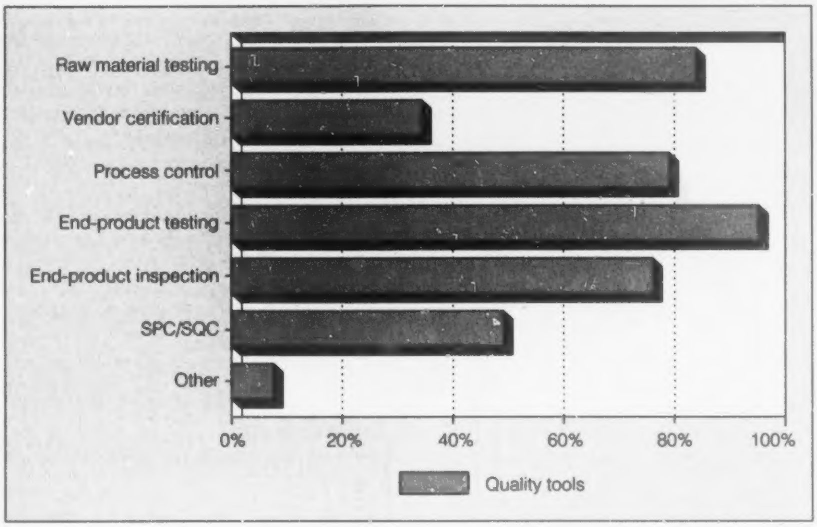


FIGURE 5: **Various tools or methods are available for mills to use in their quality programs. While almost all continue to use end-product testing, advanced methods such as vendor certification and SPC/SQC are making their way into mills.**

"other" category include daily, monthly, quarterly, and year-end trends and summaries; process tracking; customer/supplier teams; and designed experiments.

Control charts, usually associated with SPC/SQC programs, are said to be one of the best ways of involving mill operators in the quality program. Some mills believe that having the operators plot the charts manually gives those operators insight into the process; other mills have turned the function over to their process automation systems, equipped with special software, to plot the charts. The survey shows that 25% of the responding mills chart manually, 11% use an automated method, and 31% use both methods. The other 33% do not employ control charts.

Process automation plays a fairly dominant role in mills' quality programs—based on a scale of one to five, 76% rated process automation "fairly important" to "very important" (three to five) to their quality control programs. Only 20% rated process automation very low (one or two); 4% didn't answer.

With the implementation of quality programs, mills constantly search for sources to help them refine their efforts and keep them up to date on the latest quality control methods. Figure 6 shows that conferences (77%)

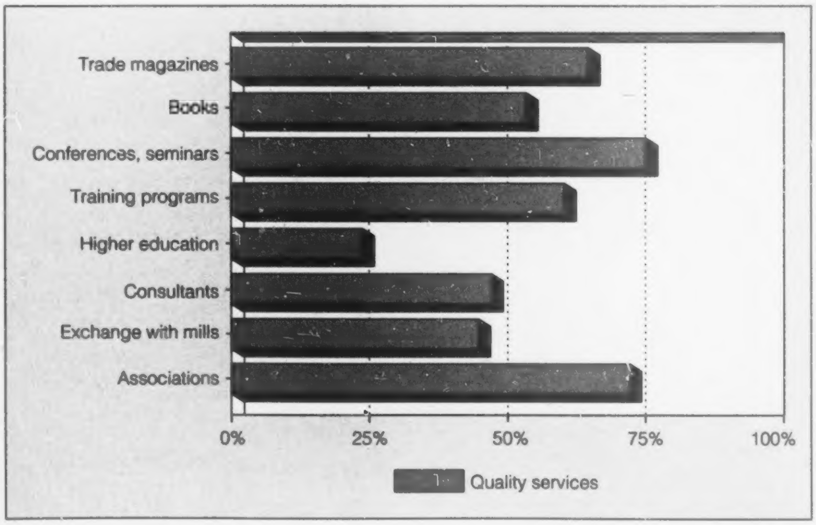


FIGURE 6: **Conferences, seminars, and associations lead as sources of information for mills' quality programs, along with trade magazines and training programs.**

and associations (74%) are important sources, as are trade magazines (66%) and training programs (62%). Books also are a top priority for guiding quality programs (see "Quality control reading list" sidebar).

When asked what process areas mills had focused their quality control programs on, respondents named numerous specific projects in almost every area of the pulp and papermaking process, including the following:

- Woodyard: purchased chip quality, chip variability, chip uniformity to digesters
- Pulp mill and bleach plant: washing and digester processes, reduced variation in white liquor, screening and cleaning stages, kappa number variation, pulp brightness, pulp viscosity
- Chemical recovery: lime kiln operation, causticizing efficiency for uniformity of white liquor, green liquor variation, black liquor solids control
- Paper machine: moisture profile control, formation, sheet stability, sheet strength, online freeness, first pass retention, caliper control, sheet cleanliness, cross-direction (CD) and machine-direction (MD) variation, size press uniformity, and pickup
- Coating: color control, coating makeup systems, starch solids control
- Finishing/shipping: roll arrival condition, slitting and trimming, roll quality inspections, reduced number of offset cores, winder operation
- Environmental: Sewer loss control, management of water use.

Respondents were also asked what process areas would most benefit from quality control programs. Many of the respondents said all areas would benefit, and most of the areas mentioned above were also listed. Others areas named include the repulper, secondary fiber processing, paper machine dry end, paper machine additive control, incoming wastepaper quality, and control of wet-end chemistry.

FOLLOWING THE QUALITY CHAIN. Quality improvement is customer driven, as evidenced by the changes in the U.S. automobile industry in reaction to foreign automobiles grabbing a large share of the U.S. market. Therefore, in almost all industries a quality chain exists where customers pass down demand for quality. The survey shows that such a chain has begun in the pulp and paper industry.

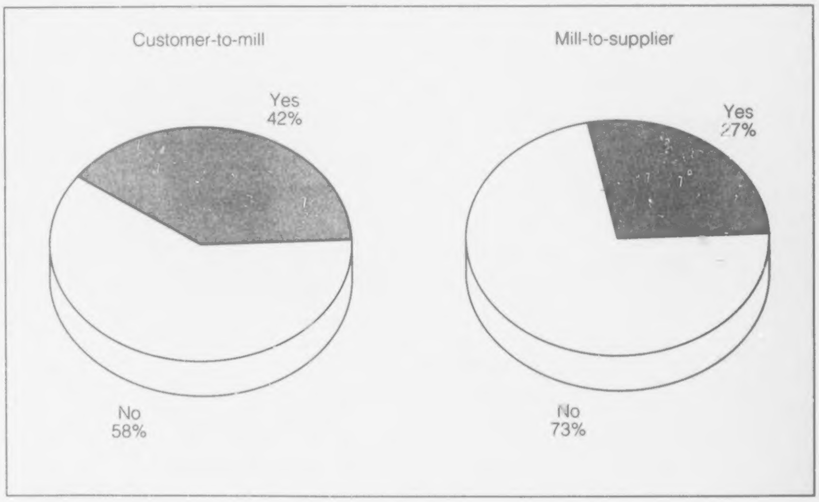
Asked if their customers require quality data with final shipments, 17% said yes, 6% said no, and 77% said it depends on the customer. When asked if their customers required the company to have some type of quality program, a surprising 42% said they did (first chart in Figure 7).

Meetings are normally an important part of the quality exchanges between customer and supplier. Almost all of the respondents said meetings depend on the customer. Most of the mills meet either annually (25%) or quarterly (25%) with their customers, and 15% said they meet monthly. Others responded that mill/customer meetings occurred biannually. With key customers, some held meetings weekly, and one mill said that it meets only for problem solving while another said "when there are complaints."

On the mill-to-supplier side, 69% of the respondents said they require quality data on raw material shipments from their suppliers, although some said it depends on the supplier or the product. But unlike the customer-to-mill demand of a specific quality program, only 27% required a quality program from their suppliers (second chart in Figure 7).

Mills also seem to be less demanding on meetings about the quality of raw materials from their suppliers. The largest number of respondents (38%) said meetings depend on the supplier, 25% said they meet quarterly, 15% said they meet annually, and 12% said they meet monthly. ■

FIGURE 7: **Tracking the quality chain shows that more customers are demanding mills to have some type of quality control program (customer to mill), while mills are just beginning to pass this demand on to their suppliers (mill to supplier).**



Managers comment on quality

Respondents to the *P&P* survey had numerous comments on the state of quality control in the pulp and paper industry. Some had comments about their own specific problems with establishing "quality thinking" at both the management level and the operator level. Others pointed out how far behind they thought the pulp and paper industry was in their implementation of quality control programs. The following are some of the opinions they expressed.

"1.) Let's join the modern world and view paper as an engineered structure rather than a commodity. 2.) Quality managers—both at the local and corporate levels—should be given more authority in the hierarchy rather than [be seen as] a 'necessary evil' or 'defect police.' 3.) Since we are driven by customers' quality demands, we should actively insist on vendor-certification programs. 4.) Off-machine (finished product) testing should become passe if our industry is willing to practice true "real time" SPC/SQC. 5.) There is a sincere frustration of quality control people being caught in the crossfire between the mill, the customer, and the operators. You will never please all (sometimes none) of the people involved. If you have all three groups mildly irritated at you, it could be said that you're doing an excellent job. Quality people tend to be called in after the fact to 'put out the fire.' Involvement should be from the chip pile through the finished product, then followed up with outstanding customer service."

—Quality control supervisor
Corrugating medium and sack kraft mill
Northwest

"We, as an industry, must continue to expand our formal focus on quality to meet the challenge of the 1990s."

—SPC manager
Printing/writing and specialty paper mill
Southeast

"The paper industry is using more quality systems and processes than its leaders recognize. Many of these have been limited to manufacturing. We need to expand this to a company-wide attitude."

—Technical director
Printing/writing paper mill
Midwest

"The first paper company that does TQM right will put itself so far ahead of its competitors, that they will never be caught."

—Manager of total quality
Coated and uncoated groundwood mill
Northeast

"I think quality is becoming a new buzz word. Unfortunately, many companies are initiating programs, instead of truly integrating quality management concepts into their everyday way of doing business."

—Coordinator
Printing/writing paper mill
Southeast

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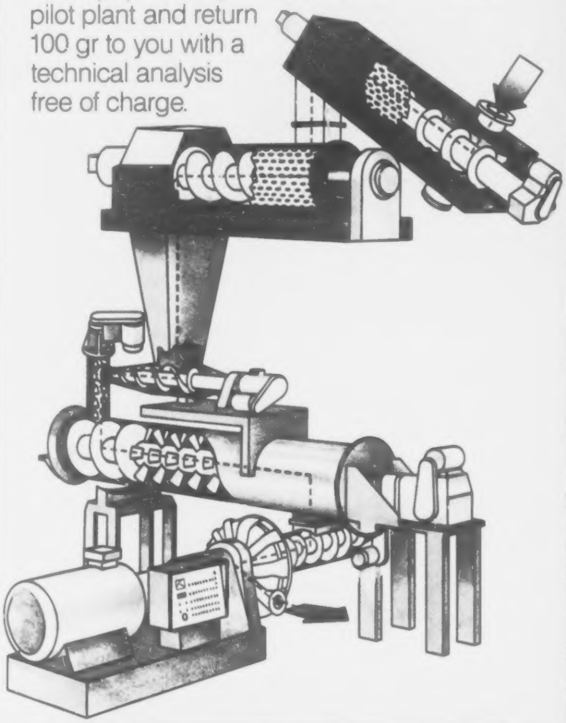

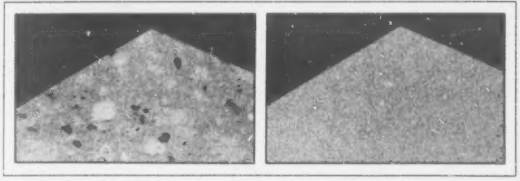

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Advanced Controls Can Help Mills Stay Competitive During Downturn

Pulp and paper companies that didn't expand in prosperous times will need technological edge to battle foreign competition, tight market

By ANN DAMIANO

The North American pulp and paper industry has recently experienced a downturn, and the market is not expected to begin recovering until mid-1992, according to many industry observers. This is partially due to increased capacity recently brought online. Such large capacity expansions were financed by high profits in the industry during the last several years.

For the next decade the pulp and paper process automation market will require a different mix of hardware, software, and services. Mills that did not originally participate in the capacity increase phase of the business cycle in the 1980s will have to find new ways to regain competitive advantage. If they do not, they face being squeezed out of what is rapidly becoming a very tight market.

To combat this problem, mills must reduce operating costs and improve product quality. One of the best and least-used methods to do this is to implement advanced controls, such as product controls, process modeling, expert systems, scheduling algorithms, and statistical quality control, designed to enhance manufacturing competitiveness throughout the mill.

INDUSTRY ANALYSIS. Since the end of World War II there have been eight complete business cycles in the U.S. economy. Expansion periods of these cycles have averaged 45 months, with the shortest lasting 12 months and the longest enduring for 106 months. Contractions in the economy have averaged 11 months and have ranged from six to 16 months in duration. Now, after eight years of expansion, the U.S. economy has slid into a downturn.

The good news is that all recessions end. DRI/McGraw-Hill predicts the recession will be mild and expects it to resemble the 1960 and 1970 recessions. This would be characterized by a peak-to-trough decline in gross national product (GNP) of about 1% and a 2% rise in unemployment. If this downturn bottoms out in spring 1991, the duration will be near the postwar average of 11 months.[1] Risks to this forecast come from the Middle East crisis and oil markets. If war brings skyrocketing oil prices, the result will be a deeper, longer recession, coupled with higher inflation rates.

Paul J. Waters, a Cahners Economics' economist who monitors the pulp and paper industry, explains that the current downturn is very psychological in nature. "This is a confidence recession; people are scared and, consequently, not willing to spend money." He says that the pulp and paper industry is one of the more healthy manufacturing sectors. Nonetheless, it has been very hard hit by the savings and loan disaster, the credit crunch resulting in a slowdown in investments, and high interest rates due in part to the Middle East crisis.[2]

In November 1990, consumer confidence fell to its lowest level since the 1982 recession. The consumer-demand sector is two-thirds of the economy's GNP. Most of this loss in confidence reflects consumers' lowered expectations of future economic conditions. As consumers ponder the Middle East war, tax hikes, and the recession, they will continue to be reluctant to open their wallets.

The current recession is different from earlier ones since a new and very powerful factor is at work—offshore competition. While worldwide growth is slowing, economies of Europe and the Pacific Rim are expected to grow at a satisfactory rate. Since there is a dissociation between U.S. and foreign capital spending, this could lead to large overseas competitors using this downturn to hammer weakened American companies.

During the 1980s, many U.S. companies restructured and shed much of their "fat." Consequently, mass layoffs and drastic cost-cutting measures are simply not feasible as an antidote to fight this recession. Brian Dumaine, in his article "How to Manage in a Recession," says that companies will need to devise ingenious ways to squeeze money out of margins, including looking at the way people go about their work, new administrative

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systems, and investments in technology. Instead of cutbacks across the board, companies must make strategic investments in their business to keep up with global competition. Battening down the hatches and trying to ride out the downturn simply will not work this time. If American companies do not continue to invest, they will find that emboldened foreign competitors meanwhile will have launched new products, cut prices, boosted advertising, and stolen market share that will be extremely difficult to recover.[3]

The U.S. pulp and paper industry is susceptible, as are other industries, to the previous scenario due to increased offshore competition in its market. For instance, U.S. producers are fortunate to have ample fiber resources available to supply their mills. They have not been forced, until the last several years, to make investments in efficient material use as have their foreign competitors. Now, to keep pace with the global market, the industry must continue to streamline business and process operations.

It appears that the pulp and paper industry's health parallels the economy in general. Before this current downturn, the industry experienced eight earnings declines in the last 30 years. Four of these downturns occurred during times of decline in real GNP. Of the remaining four declines, one saw the dollar at the highest level in decades. Therefore, in the last 30 years, there have only been three occasions when the pulp and paper industry's earnings have fallen without a general recession.

While a recessionary scenario in the U.S. economy is a problem, it is not the primary one. The current earnings decline in the market is caused by a deterioration in supply-and-demand conditions brought on primarily by excessive capacity expansion and now exacerbated by a sluggish U.S. economy. The industry now faces higher operating costs and falling demand. Higher operating costs were often associated with bringing new capacity online, and shrinking demand can be tied directly to economic woes.[4]

Thomas F. Murphy, director of pulp and paper marketing at Honeywell, says, "It is important for those mills that did not take part in the capacity expansion to modernize while profits in the cycle are still high enough to support the investment. Without it, a firm can find itself with higher production costs and lower competitive quality when a shakeout occurs and forces marginal performers out of the market."[5]

Net income for the industry reached its peak in first-quarter 1989 and stayed there for two more quarters before declining in the fourth. The peaking of industry income was related to the slowing economy but was not the primary reason. It had much more to do with the capital cycle of the pulp and paper industry and the fact that supply and demand conditions had begun to deteriorate as part of the business cycle.

After the 1981-82 recession came to a close, the economy began an eight-year expansion. Profits began to rise. Using these profits, the industry embarked on a major capacity expansion to support strong demand and high prices for its products. With strong consumer spending leading the way, the industry was able to finance huge mill expansions and deal with the increasing pressure on environmental control.

INDUSTRY CAPITAL SPENDING TO FALL. During the last five years, the industry has more than doubled capital investments. From a long-term perspective, a modest dip is expected in the next several years before recovering by the middle of the decade. The focus of the spending, in the short term, will shift from capacity expansion to environmental control.

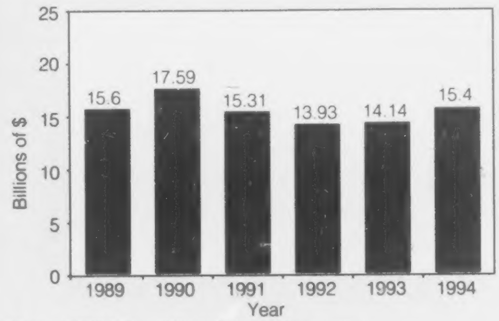
Pulp and paper producers spent at record levels in 1990, with expenditures reaching $17.6 billion. DRI/McGraw-Hill explains what will happen to pulp and paper spending in the near future. "Capital spending will undergo a sharp cycle during the next several years: down sharply in the next two years and then up significantly in 1994-95." The resulting 1.5% average investment increase is in addition to the high level of investments made in 1988 and 1989. Despite a 1.8% growth in annual output, this will push the pulp and paper industry's capacity utilization rate down more than 15 percentage points between 1989 and 1995 (Figure 1).[6] Producers will be under enormous pressure to control costs if they expect to participate in this highly competitive global market.

According to a study done by Cahners Economics, the pulp and paper industry will be the manufacturing sector fourth hardest hit by the new Clean Air Act pollution control regulations. When the new law goes into effect, the industry will be forced to spend approximately $2.8 billion in about three years to comply (Figure 2). This includes $1.3 billion for maintenance and repair on operations plus $1.5 billion for new capital equipment. These figures are discounted over three years. In the face of already declining capital spending, the industry must earmark a sizable part of its available capital to comply with government regulations. Fewer funds are then available for major capital projects.

RESTRUCTURING ABOUNDS. It is evident that the market is restructuring itself. Companies are buying and selling timberland, mills, converting plants, and entire divisions. They are taking a hard look at their operations and asking themselves fundamental questions such as "What is the business we want to be in?" James River Corp., for example, recently announced a sweeping restructuring of its operations. The company plans to sell off some 30 mills and concentrate on four core businesses. It will also expand its operations in Europe, where it operates two joint ventures with European companies.

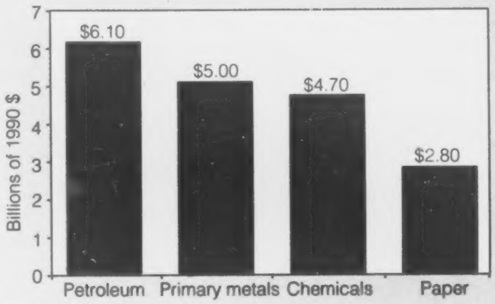
Boise Cascade Corp. said that it will reduce its presence in the Northwest pulp and paper market and concentrate on white paper, office products distribution, and building products. Georgia-Pacific Corp. plans to

FIGURE 1: **Pulp and paper industry capital expenditures.**



Source: DRI/McGraw-Hill capital spending memo.

FIGURE 2: **Clean Air Act expenditures (billions of 1990 dollars).**



Source: Cahners Economics.
1. Includes $ for capital replacements discounted over three years.

sell off nearly $1 billion in assets to reduce the debt load from its acquisition of Great Northern Nekoosa.

Smart firms have realized that with the increasing competitiveness of the marketplace, they must be sleek and efficient to compete in tomorrow's global market. Some companies mentioned have already taken steps to accomplish these goals by consolidating operations and reducing debt in their capital structure. Companies can also combat the downturn by reducing operating costs and improving product quality without massive capital expenditures. A key tactic is implementing advanced controls as a strategy to improve mill operations.

IMPACT OF ADVANCED CONTROLS IN THE MILL. The return on investment (ROI) for advanced controls is generally ten to 15 times higher than for hardware expenditures. ROI on advanced controls projects can range from 50% to 100%. This is significant when the criteria for justifying a project have become more stringent. Paybacks on these types of projects are generally within one year on the upside and two years on the downside, crucial when jittery stockholders are looking for immediate results.

For purposes of this article, the following definition of advanced controls will be used, provided by Michael T. Brown, pulping application consultant for Honeywell: "Advanced controls are higher-level controls based on modeling, special algorithms, and statistical quality control, among others. They reside above and coordinate lower-level regulatory control (e.g., flow, temperature, and pressure) to achieve an operational objective (e.g., reduce kappa number variation)."[7]

Michael F. Saucier, president of Process & Instrumentation Diagnostics, explains that the use of advanced control technology can enable a mill to maximize the performance of an existing control system. "When a distributed control system is first installed, it may take some time to get the system up and running to the customer's satisfaction. From that point on, the performance of the system will deteriorate over time unless periodic system surveys are done and the system is fine-tuned. These tunings will keep the system at the same or slightly higher levels of functionality, due to the learning curve on the system and of the process."

However, an even higher level of system performance can be achieved through the implementation of advanced controls (Figure 3). Advanced control solutions allow users to extract maximum performance from the control system without excessive capital expenditures.[8]

Advanced controls enable a mill to achieve optimum performance from existing technology and feature the flexibility to be modified or expanded as new technology evolves. There are a great number of opportunities for increased efficiency and cost savings in the mill.

The pulp mill has excellent potential for cost savings and improved quality using advanced control solutions. The primary objectives for advanced controls in the pulp mill are to maximize production, minimize costs, and produce a uniform-quality product. Pulping costs are increasing for several reasons:

- Increased competition for and restrictions on wood supply (e.g., spotted owl controversy)
- Process changes for dioxin formation reduction
- Greater ratio of recycled fiber to virgin fiber due to increased government regulations.

Also, there is a move to a "just-in-time" (JIT) manufacturing environment in the pulp and paper industry. The producer must be able to switch between grades while maintaining coordinated production modifications that will require increased manufacturing flexibility throughout the mill.

Kamyr continuous and batch digester control-optimization packages are available that, when used with basic regulatory control, enable the pulp mill to stabilize digester operations, improve product quality and uniformity, and reduce cooking costs. The following figures are estimates of some reductions/savings that can be achieved. A site analysis would confirm potential savings by comparing current levels of control in use at a particular site. The intent is to offer an idea of the various areas where savings can be realized.

In the continuous-digester process area of the mill, there is potential for the following reductions:

- Decreased K/Kappa variation (20%)—potential for improved downstream operations and K/Kappa target shift
- Increased pulp yield (1% additional)—increase in dollar savings, since there is less wood going into the digester and more pulp production
- Decreased steam consumption (5%)—savings in terms of lb of steam/air-dry (a.d.) ton of pulp
- Increased washing efficiency—higher black liquor solids (2%) and less alkali carryover
- Decreased white liquor use (5%)—partially due to tighter liquor-to-wood and chemical-to-wood control.

Other savings can result from decreased downtime of the digester as well as increased efficiency from operators due to better visibility of the process.

In a batch digester facility, the implementation of an advanced control solution can result in the following savings:

- Decreased K/Kappa variation (30%)—provides both smooth operation and the capability to shift the target to reduce cooking costs
- Increased overall pulp production (1.5% to 5%)—resulting from better charging methods and more advanced production scheduling controls
- Increased pulp yield (0.5% to 1.5%)—due to improved charging and cooking controls
- Reduced steam demand (10%)—as measured in lb/a.d. ton of pulp
- Reduced steam flow variation (25% to 60%)—as measured by peak-to-peak variation.

In addition, the use of advanced controls in the batch digester process area can reduce the solids load to the recovery plant. The improved production control eases coordination with the boiler house, resulting in lower steam demand and reduced steam consumption. An efficient controls package will also result in better utilization of the labor force.

Mills that have implemented advanced controls in the bleach plant have realized savings in the range of $500,000 to $750,000/year. This comes from reduced use of the expensive chemicals needed in the bleaching process and improved product quality. Benefits to implementing advanced controls in the bleach plant follow:

- Reduction of off-specification pulp
- More on-target brightness of pulp
- Higher and more uniform pulp strength
- Reduced bleaching costs
- Lower effluent costs
- Reduced raw materials use.

Examples of reductions that can be achieved are as follows:

- CE kappa number—reductions of up to 40% have been realized in CEK variability. This means additional chemical cost savings, such as hypochlorite, and reduced variability in the final brightness of the pulp.
- Bleaching chemicals use—reductions of 5% in chlorine use and 9% in chlorine dioxide use.

The bleach plant has been the focus of increased environmental control. Many mills are modifying their processes to comply with new governmental regulations. In the future, advanced controls will enable mills to have better control over environmental parameters, such as kappa factor, defined as the following:[9]

$$\text{kf} = \frac{\text{\% total equivalent chlorine applied to stock}}{\text{kappa number}}$$

In addition, the use of advanced control solutions in the bleach plant will allow the mill to minimize off-specification pulp during production rate changes and grade changes.

Improvements can also be realized in the lime kiln. These include maintaining stable lime kiln hot-end temperature by controlling ID fan, fuel, primary air, production rate changes, and kiln speed. Features of such systems include constant cold-end temperature and overall kiln profile control, minimum O_2 level control, acceptable total reduced sulfur (TRS) emissions control, and protection of refractory material from high-temperature excursions.

In the paper machine area, packages are available that control the ratio of dry fiber furnish and chemical addition in paper machine stock. There are also machine-direction and cross-direction controls for basis weight, moisture, and caliper. Benefits include reduced blend variability, quick grade change, reduced off-specification paper, improved broke utilization, higher reliability, and production monitoring.

WHAT TO LOOK FOR IN A SUPPLIER. In evaluating a vendor from whom to purchase advanced controls, several factors should be considered. It must be determined if the package can be customized to fit a currently installed system and if more features and functions can be added later. Using one source for distributed and advanced controls can further reduce costs as well as provide complete accountability, supplier loyalty, and a better product.

Saucier says that one of the most important advantages of advanced controls is that the performance of the software can be documented and guaranteed. "You should demand a performance guarantee from a supplier, and if they are unable or unwilling to provide one, then you should find another vendor." The use of advanced control technology in process automation systems is a relatively small expenditure and, when combined with a guarantee, removes the risk from the investment. In making an evaluation, a vendor should work with a mill and provide the following important services:

- Identify customer needs: The advanced control supplier should work with the mill to help evaluate what needs to be done and identify a preliminary scope of work to be performed.

- Provide presale support: At this stage, the vendor should work with the mill to more fully define the solution to its problem. This entails feasibility studies, cost/benefit analysis, and assistance in defining system specifications. To help justify the project to mill management, the vendor must be able to show projected savings in each process area slated for advanced controls.
- System design: The system requirements should be mutually agreed upon. The system must be customized to fit the specific needs of the process.
- Design implementation: The vendor should provide comprehensive project implementation and installation services resulting in a high-quality system that meets the requirements identified in the system design phase of the project.
- Project installation: During installation, the software and any special hardware are installed in the mill and integrated with other systems as required.
- Customer acceptance: The project is not complete until both the mill and the supplier agree that the acceptance criteria have been met.
- Project follow-up: The custom solution supplied to the mill should be fully supported by the advanced control supplier, including warranty.
- Results report: If the mill desires, the vendor should be willing and able, after the system is installed and on control, to perform a postproject audit.

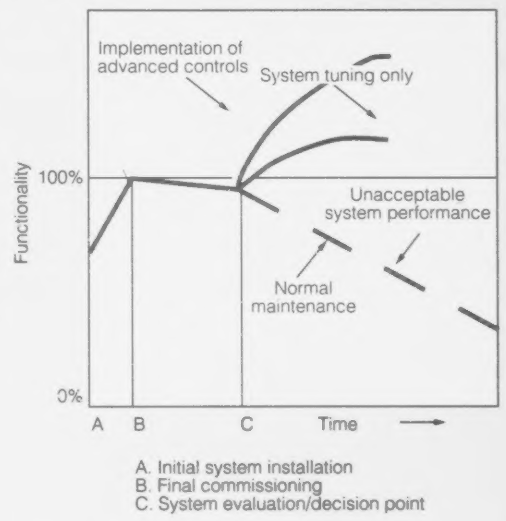
Finally, successful implementation of an advanced control solution is a function of people as much as a function of the package. The supplier must understand both the mill's process and business goals. The use of advanced controls is important when the pulp and paper industry has generally seen a reduction in engineering technical staff. This is especially surprising since it has occurred during a time of rapidly changing process and automation technology.

A supplier must have more than one expert in any one process area, and asking for résumés is not uncalled for. Extensive experience in the pulp and paper industry is necessary so the vendor can work as a partner with a mill to help it achieve objectives.

Relationships between pulp and paper producers and suppliers have been evolving during the last several years. The industry has been moving toward establishing relationships with suppliers of vital resources because of the increased demand for a high-quality product. This is especially true of intellectual resources. Consequently, producers can increase the responsibility and accountability of their suppliers and, in turn, better meet the needs of their customers.

Markos I. Tambakeras, vice president of Honeywell's Industrial Automation Systems Business, explains this shift in philosophy. "The evolution of advanced control technologies has driven pulp and paper companies to view differently not only their use of technology but also the suppliers of new technologies. Advanced controls become a strategic weapon, and partnership becomes the only way to guarantee the successful use of that weapon."[10]

FIGURE 3: **By implementing advanced controls, a higher-than-normal level of system performance can be achieved.**



Source: Michael Saucier, PID Inc.

As the industry moves through the business cycle, those who make strategic investments will have a competitive advantage over those who do not. The implementation of advanced controls is a proactive way to capitalize on the current recession. Advanced control solutions are a key business strategy to lower costs and improve product quality during times of reduced capital availability.

A recession can be the time to take advantage of weakened competitors and to seize market share. Advanced control technology enables manufacturers to improve their manufacturing competitiveness now and, in turn, be better prepared for the next expansion. ■

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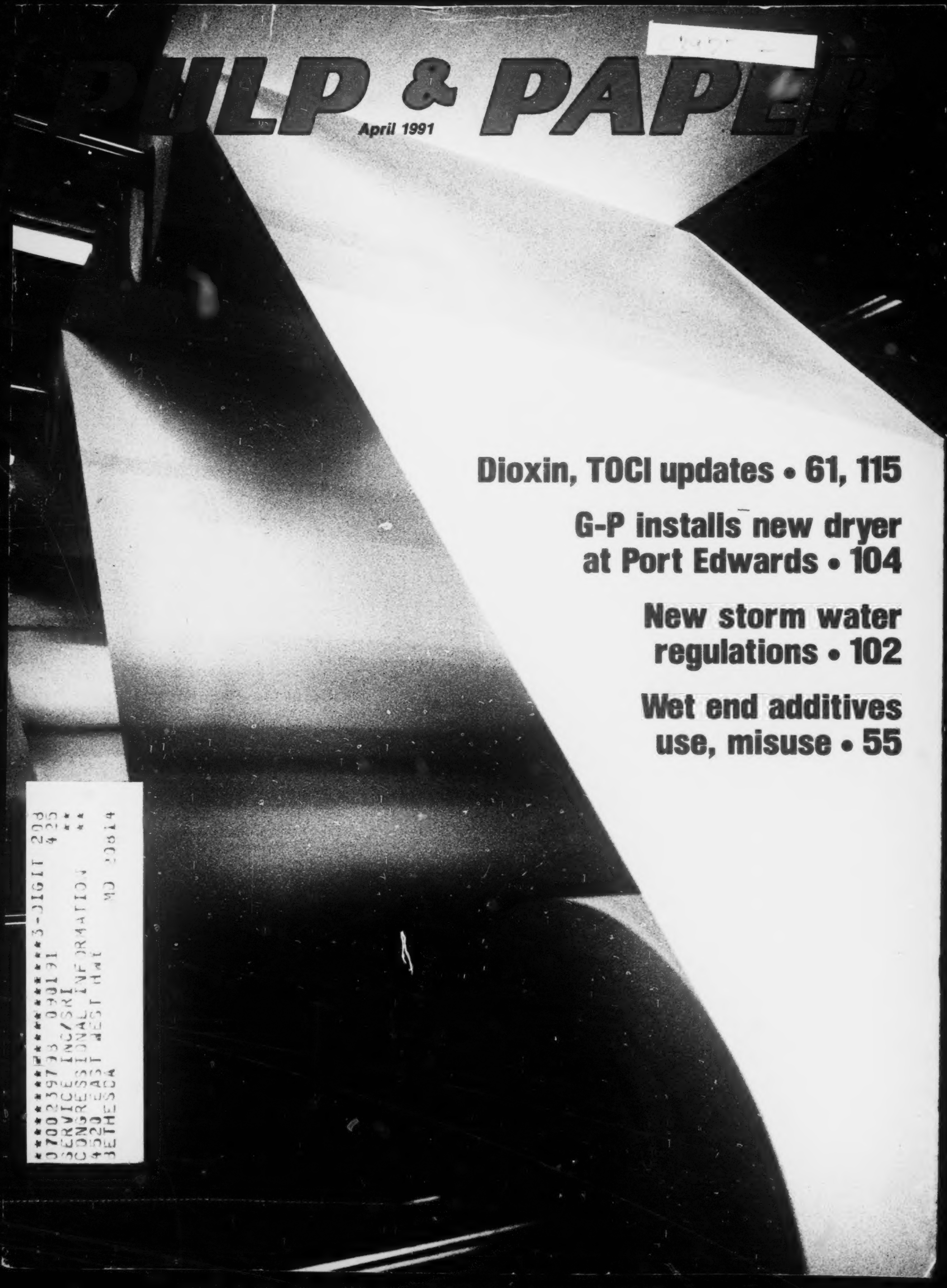

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This issue's focus on papermaking discusses various methods North American pulp and paper mills are implementing to improve quality and production of paper and paperboard. **(Photo courtesy of Weyerhaeuser Paper Co.)**

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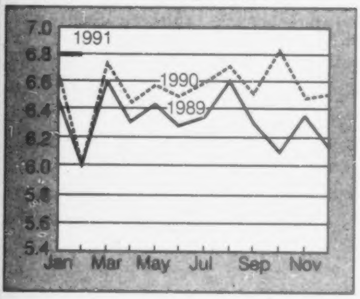
U.S. paper and board production



U.S. production of paper and paperboard totaled 6.8 million tons in January, up 1.7% from the same month last year, according to the American Paper Institute. Production of paperboard was up 4.5% compared with January 1990, but paper output dropped 0.9% as a result of the recession. Inventory building at containerboard mills and box plants accounted for much of the gain in paperboard production, API reported. Without the buildup at box plants, production would have fallen 8% below the January 1990 level.

Among major grades, printing and writing paper shipments were off 3.2% as the recession cut into magazine and other print advertising, stationery sales, and new business formation. Newsprint output remained strong, reaching a new high of 580,000 tons in January, and API reported strong demand in the southern and western U.S., where new paper machines came online last year. Containerboard production was up 6.0%, while boxboard posted a 1.1% gain.

Canadian newsprint shipments totaled 765,000 metric tons in January, an increase of 7.0% over a year earlier. Woodpulp shipments were up 12.7%, to 691,000 tons. Operating rates stood at 96% for newsprint mills and 88% for woodpulp. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Jan.	580	4.9	6,954	4.7
Uncoated groundwood (s)	Jan.	144	-8.3	1,724	-7.7
Coated paper (s)	Jan.	629	-2.2	7,551	-3.0
Uncoated free-sheet (s)	Jan.	981	-1.5	11,767	-1.9
Other printing/writing	Jan.	130	-4.4	1,557	-1.0
Total packaging and other paper (s)	Jan.	394	-5.7	4,729	-1.4
Tissue	Jan.	485	2.3	5,825	2.5
Total paper	**Jan.**	**3,342**	**-1.0**	**40,107**	**-0.9**
Unbleached kraft paperboard	Jan.	1,823	8.1	21,869	8.0
Semichemical medium	Jan.	497	1.4	5,959	1.5
Bleached paperboard	Jan.	393	2.3	4,710	2.3
Recycled paperboard	Jan.	750	-0.3	8,995	-0.4
Total paperboard	**Jan.**	**3,462**	**4.5**	**41,544**	**4.5**
Total U.S. paper and paperboard output	**Jan.**	**6,804**	**1.7**	**81,651**	**1.8**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Dec.	5,428	8.8	63,275	2.1
Market pulp production	Dec.	735	13.4	8,823	1.8
Wastepaper consumption at paper/board mills	Dec.	1,726	8.1	21,039	7.9
Pulpwood consumption (cords)	Dec.	8,012	1.0	99,109	0.7
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft^2)	Jan.	27.227	-1.4	27.227[6]	-1.4
Containerboard inventories at U.S. box plants and mills	Jan. 1	2,765	6.8		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Dec.	988	-1.8	13,006	0.7
Imports of Canadian newsprint	Dec.	613	-8.4	8,118[6]	-2.6
U.S. paper exports (including products)	Dec.	523	2.3	6,787	8.4
Exports of unbleached kraft linerboard	Dec.	201	2.0	2,589	16.8
Exports of woodpulp	Dec.	477	-18.5	5,905	-5.2
Norscan pulp inventories[4]	Jan. 31	1,512	6.3		
Norscan pulp operating rates[4]	Jan.	89%	82%	82%	87%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Jan.	765	7.0	765[6]	7.0
Operating rates	Jan.	96%	98%	96%	98%
Inventories held by U.S. consumers	Jan. 31	n.a.	—		
Other paper/board shipments	Jan.	603	-1.8	603	-1.8
Woodpulp shipments (export only)	Jan.	691	12.7	691	12.7
Operating rates	Jan.	88%	95%	88%	95%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Uncoated free-sheet: Market shudders as new capacity drives prices down

Grade structure: Uncoated papers are made mostly from chemical pulps (sulfate, sulfite, soda, cotton linters, or vegetable fiber). Few uncoated free-sheet mills add any mechanical pulp to the fiber mix (to be called free-sheet it must contain less than 10% mechanical), but mills are introducing furnishes, such as bleached chemi-thermomechanical pulps (BCTMP) and recycled fibers, which can be combined with kraft pulp to reduce the cost of manufacture while providing a better grade of paper than stone groundwood or other mechanical pulps. A number of mills have converted some or all of their machines to alkaline-based paper, and many new installations are based on the alkaline process.

Four subgroupings are based on end use: publishing, commercial printing, office/business, and writing. A smaller subgrouping includes products such as cigarette papers and carbonizing tissue.

Offset and copy papers each represent about one-quarter of uncoated free-sheet production in the U.S., with offset dropping slightly as reprographic paper is used more and more in such applications as computer page (laser) printers, copiers, and other office technologies. Forms bond represented almost 20% of 1989 production, while envelope was just under 11%, tablet dropped from about 4% to just over 3%, and text and cover grades were about 3.7%. The balance was composed of miscellaneous printing/writing paper.

Production/capacity: U.S. production of uncoated free-sheet is concentrated primarily in the Northeast and upper Midwest, although capacity in the South has grown strongly during the past 20 years. Capacity has also increased in Canada, where four new uncoated free-sheet machines have come online since 1987.

American Paper Institute estimates indicate U.S. uncoated free-sheet paper capacity (including cotton and thin) is expected to grow 10.3% to almost 13.4 million tons for the 1990-93 period. Canadian capacity will advance 5% in 1991 from 1990 after a 16.6% growth from 1989 to 1990, according to the Canadian Pulp & Paper Assn.

New capacity onstream by the end of 1991 will include Boise Cascade Corp.'s 300,000-tpy machine at International Falls, Minn. (December 1990); Willamette Industries Inc.'s 255,000-tpy machine at Bennettsville, S.C. (September 1990); Georgia-Pacific Corp.'s 325,000-tpy machine at Ashdown, Ark. (May 1991); and Union Camp Corp.'s 240,000-tpy machine at Eastover, S.C. (May 1991). Federal Paper Board is considering its first uncoated free-sheet printing/writing paper machine for Augusta, Ga., rather than a previously planned bleached paperboard machine. The two grades are similar, and Federal already makes bristol paper sold in the printing/writing markets.

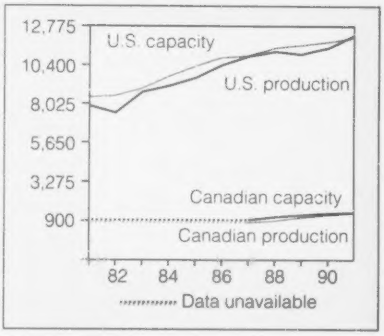
Outlook: Operating rates remain fairly strong despite some slackening in 1989. But, by mid-1990, rebuilding of inventories and generally strong demand was boosting shipments above year-earlier levels. The recession that began in 1990 and continues into 1991, along with the addition of almost 1 million tons of capacity in 1990-91, is dampening pricing, but operating rates are staying above 90%.

Pricing: The deep discounts of 1989 and early 1990, as high as $60 to over $100/ton, are repeating themselves in 1991, especially on cut-size copy paper, offset grades, forms bond, and some other grades.

Price trends for two important grades are (year-end, $/short ton, list): book paper, No. 3 offset, 45-lb sheets: 1986, $850; 1987, $850; 1988, $1,020; 1989, $940; 1990, $1,020. Bond, No. 4, reprographic, 20-lb, 83-bright: 1986, $820; 1987, $820; 1988, $960; 1989, $920; 1990, $960.

Markets: Subgrade market shares in 1990 (approximate): bond and reprographic 27%; mimeo and duplicating 0.3%; forms 18%; offset printing 24%; envelope 11%; tablet 4%; carbonless 7%; other 8.7%. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	**1989**	**1990**	**1991e**
Production[1]	11,081	11,510	11,844
Capacity	12,092	12,145	12,717
Utilization rate	91.6%	94.8%	93.1%
Imports	583	743	754
Exports[2]	122	233	252
Apparent U.S. consumption	11,542	12,020	12,346
lb/capita[3]	93.33	96.17	97.79
GNP ratio	2.78	2.90	2.88
Canada			
Production[4]	1,155	1,359	1.387
Capacity[4]	1,451	1,692	1,777
Utilization rates	79.6%	80.3%	78.1%
Exports[4,5]	465	662	682
Consumption[4]	690	697	705

1. API. 2. Not directly comparable with 1989. 3. Revised. 4. CPPA. 5. More than 90% is shipped to U.S. e=Estimate. Source: *Pulp & Paper*.

TOP NORTH AMERICAN PRODUCERS

	Annual capacity (000 tons)	**Market share (%)**
1. International Paper	2,100	14.6
2. Georgia-Pacific/GNN[1]	2,100	14.5
3. Champion International[2]	1,226	8.5
4. Boise Cascade	1,205	8.3
5. Union Camp[3]	900	6.2
6. Weyerhaeuser[4]	765	5.3
7. James River	730	5.0
8. Domtar	650	4.5
9. Mead[5]	520	3.6
10. Willamette	479	3.3

Market share of top five companies:
52.3%
Market share of top ten companies:
77.0%
Total North American capacity (1991)[6]:
14,494 million short tons

1. New 320,000-tpy machine at Ashdown, Ark., starts up mid-1991. 2. Year-end 1990 capacity. 3. New 250,000-tpy machine starts up mid-1991. 4. Includes Prince Albert, Sask. 5. Includes carbonless basestock. 6. Includes all other companies.

FINANCE

U.S. paper industry profits plunge

The cyclical downturn in the U.S. paper industry appeared to pick up momentum in fourth-quarter 1990 as earnings plunged 50% from a year ago. This resulted in a 32% decline in industry earnings to $4.3 billion for all of 1990 even though total revenues increased 5.5%, according to a *Pulp & Paper Week* survey of results from 30 U.S. companies. Profits in the fourth quarter were hurt by weaker markets for some pulp, paper, and packaging grades, but the decline was exacerbated by year-end writeoffs, operational problems, higher interest costs, and depressed wood products markets. A number of major forest products companies suffered declines of 70% to 80% or more as some "wrote off everything but the kitchen sink," according to one analyst.

Industry totals do not include income results from Fort Howard Corp., which included nonrecurring items related to its 1988 leveraged buyout. Most paper company chief executives said they expected to see the weakness continue at least through first-quarter 1991 due to the softening economy, uncertainty caused by the Persian Gulf conflict, and further erosion in markets for most grades. "The year ahead will be difficult as we contend with increased industry capacity as well as an economic downturn," noted Union Camp Corp. chairman and CEO Gene Cartledge. Nevertheless, some industry executives expect paper and wood products markets to begin picking up by the second half due to such factors as declining interest rates, lower oil prices, and the weak U.S. dollar.

Sales results for International Paper Co. again topped U.S. companies, rising 14% to $13 billion in fiscal 1990. CEO John A. Georges said that fourth-quarter and full-year earnings were in line with analysts' expectations and were "reasonably good, given the nation's poor economic climate." IP cited a continued strong performance from its European paper businesses and solid business from the printing/writing paper and specialty products groups. Export sales of linerboard and bleached board also bolstered operations, IP said, but the sagging economy seriously impacted the paperboard and packaging group.

While paper unit results for large integrated manufacturers held their ground, weak housing starts and declining consumer demand devastated wood products operations across the board. Georgia-Pacific Corp. reported a 45% decline in profits on sales of $12.7 billion in 1990 (including the acquisition of Great Northern Nekoosa in March of last year). Pulp and paper segment operating profits rose 6.7% to $979 million, but the building products business declined 20.6% to $423 million from the previous year.

Weyerhaeuser Co. said operating results for its forest products operations were down 22% and pulp and paper products were down 29%. Annual income dropped 35% to $394

U.S. paper/products results.

		Fourth-quarter 1990		
Companies	**Sales 1990**	**% change 1990/89**	**Earnings 1990**	**% change 1990/89**
Badger Paper Co. Inc.	$18,007	8.2	$2,771	79.4%
Boise Cascade Corp.	1,015,170	−4.8	4,810	−90.6
Bowater Inc.	353,250	−3.9	18,286	−43.2
Champion International Corp.	1,251,814	−1.2	26,918	−73.9
Chesapeake Corp.	198,833	−3.5	1,786	−82.7
Consolidated Papers Inc.	234,379	−3.5	30,237	−31.9
Federal Paper Board Co. Inc.	437,453	3.8	22,895	−60.5
Fort Howard Corp.[1]	292,285	8.5	(29,756)	—
Gaylord Container Corp. (1st Q)	173,000	−5.5	(9,900)	NM
Georgia-Pacific Corp.[1]	3,057,000	25.4	62,000	−60.5
P.H. Glatfelter Co.	158,438	10.8	25,940	19.8
International Paper Co.[1]	3,300,000	13.8	160,000	−18.8
James River Corp.[1]	773,837	10.0	35,877	5.1
Kimberly-Clark Corp.	1,646,200	12.5	111,200	0.5
Longview Fibre Co. (10/31)	182,651	0.7	14,489	6.5
Louisiana-Pacific Corp.	366,100	−27.7	(3,900)	NM
Mead Corp.[1]	1,135,100	5.3	(92,900)	NM
Mosinee Paper Corp.	49,613	−15.2	2,572	−130.1
Pentair Inc.	293,938	3.2	10,856	19.2
Pope & Talbot Inc.	128,719	−12.0	(3,311)	NM
Potlatch Corp.	290,691	−7.9	4,556	−88.6
Scott Paper Co.[1]	1,431,000	10.6	49,500	−30.9
Sonoco Products Co.	429,336	6.1	26,883	9.0
Stone Container Corp.	1,443,800	−0.4	9,400	−85.5
Temple-Inland Inc.	618,000	26.4	48,100	8.3
Union Camp Corp.	715,383	5.8	52,166	−16.1
Wausau Paper Mills Co. (11/30)	89,310	3.6	6,034	264.2
Westvaco Corp. (10/31)	655,343	7.7	48,312	−20.5
Weyerhaeuser Co.[1]	2,085,886	−18.7	58,818	−58.5
Willamette Industries Inc.	459,696	−3.4	12,247	−76.1
Total	**$23,284,732**	**4.4%**	**$736,642**	**−50.7%**

Net income after taxes, from continuing operations. ( ) = losses. NM = not meaningful.

1. **Fort Howard Corp.** Because of complex nonrecurring items and special writedowns, 1990 income losses were not included for the U.S. industry total. **Georgia Pacific Corp.** 1990 results reflect the acquisition of **Great Northern Nekoosa Corp.** beginning Mar., 1990. Figures for 1989 were not adjusted to show consolidated operating results. **International Paper Co.** Net income figures exclude a net charge of $137 million after-tax, related to disposition of certain assets. **James River Corp.** The company computed its earnings on a pro forma basis for its transitional fiscal year, making its fourth quarter nine weeks long. **Mead Corp.** Results for 1990 include a charge of $107.2 million related to writedowns. **Scott Paper Co.** 1990 earnings exclude an after-tax charge of $100 million related to restructuring and the selling of nonstrategic businesses. **Weyerhaeuser Co.** 1989 income excludes restructuring charges of $270 million after tax.

million. Weyco said demand for pulp and paper products held up but markets were weakened by overcapacity. "I look for further decline in earnings in 1991," president and co-CEO John W. Creighton said recently. "I'm matching up my view of the economy with my view of earnings this year, and that's very bleak. I think economists who have characterized this recession as short and shallow are incorrect." He added that interest rates are already relatively low, and lowering them further will not have as great an expansionary impact as in the past.

James River Corp.'s results include its planned restructuring, the sale of its nonwovens division in April 1990, and the shutdown of a specialty paper mill the same month. JR realigned its fiscal year, and pro forma results are presented as if each of these transactions had been completed before the first day of each period presented, the company said. The company singled out the performance of its Food & Consumer Packaging Business, which was heartened by McDonald's decision to use its Quilt-Rap products to replace foam clam-shell containers.

Large profit drops. Several major paper/forest products companies saw their profits practically evaporate in the fourth quarter. Champion International Corp. reported a 74% drop in earnings for the quarter, which resulted in a 48% decline for the year. The company blamed the falloff on severely depressed conditions in the wood products industry, weakening world pulp markets, lower prices for several of its paper grades, startup difficulties in connection with several major rebuilds, and a significantly higher tax rate, mainly due to the company's Brazilian operations.

Fourth-quarter earnings for Boise Cascade Corp. plunged 91%, which resulted in a 72% decline in net income for the year. Operating income from paper declined substantially, reflecting lower prices for many grades and continued operating difficulties at the Rumford, Maine, mill, Boise said. The company capitalized $14.5 million of preoperating costs associated with the successful startup of its new paper machine in International Falls, Minn., in the fourth quarter. Office products income was also down, and building products income practically disappeared in the fourth quarter. Mead Corp. was batted by various writedowns and weak markets for pulp and wood products. Writedowns and nonrecurring charges totaled $107.2 million in the fourth quarter, resulting in a loss of $92.9 million for the period. Net earnings for the year totaled $38.5 million, down from $215.8 million a year earlier. Writeoffs were mainly related to assets of Mead Imaging and Ampad.

Containerboard profits decline. A relatively modest drop in profits for the fourth quarter and a 23% decline for the year was reported by Union Camp. Chairman and CEO Cartledge said that during the fourth quarter, the "demand for paper and packaging products remained healthy in spite of the weakening overall economy. Pricing for uncoated business papers continued to improve to levels slightly above those of the fourth quarter of 1989. However, prices for liner and corrugated containers, while stable with third-quarter levels, were well below those of a year ago."

Stone Container Corp. announced an 85% decline in profits in fourth-quarter 1990, compared with a year earlier. This resulted in a 67% decline in earnings for the year on an 8% increase in sales. The company said it was impacted by higher interest expense and higher effective tax rates in the fourth quarter. Tax rates increased to 73.4% for the fourth quarter, compared with 43.4% for fourth-quarter 1989.

Following a $9.9 million loss in the first quarter of fiscal 1991 that ended Dec. 31, and after losing $5.8 million in the previous quarter, Gaylord Container Corp. announced that it plans to "temporarily idle" production on two containerboard machines at its Antioch, Calif., mill, affecting about 300 employees. The combined Antioch mill is the largest containerboard facility in California, with total capacity of about 1,800 tpd. Interest charges on the company's outstanding debt climbed to $25.8 million in the first quarter from $15.2 million a year ago, the company said.

Tissue stays tight. Again among the strongest performers were tissue companies and also some smaller specialty paper mills that are benefiting from the lower purchased pulp and wastepaper costs. For the seventh year in a row, Kimberly-Clark Corp. reported record yearly and fourth-quarter results. Excluding charges related to the divestiture of its stake in Spruce Falls Power & Paper Co., K-C's net income was up 12.3% on the strength of European sales, lower pulp prices, and positive results from increased advertising.

However, Scott Paper Co. noted that its earnings failed to reach a new record for the first time since 1983. The company said U.S. and world tissue operations showed improved earnings in 1990, but income from the S.D. Warren printing/writing paper division was down about 30%. The decline reflected operational problems at the Muskegon, Mich., and Skowhegan, Maine mills, where major capital expansion projects were under way.

Fort Howard Corp. again showed quarterly and annual profit losses but said that its fourth-quarter 1990 operating income was 6.7% higher than it was in 1989, excluding the effects of noncash charges. The losses resulted from increased interest expense, goodwill amortization, and financing costs that arose in connection with Fort Howard's 1988 leveraged buyout, the company said. Fort Howard reported a net loss of $29.8 million, compared with a loss of $34.8 million in fourth-quarter 1989. The annual profit loss was $106.2 million, compared with a loss of $239.4 million for 1989. Earnings results for the company were not included in the overall industry total.

Wood product woes. Louisiana-Pacific Corp. reported a loss of $3.9 million for the fourth quarter—its first quarterly red ink since 1982. "Our building products segment was hit hard by the clear recession in the homebuilding industry. The pulp market also declined steadily from the excellent levels of 1989," said chairman and CEO Harry A. Merlo. "We don't see any signs of improvement in the first quarter." Pope & Talbot Inc. reported a $3.3-million fourth-quarter loss caused by operating problems and higher costs at its Halsey, Ore., pulp mill and a restructuring charge.

Potlatch Corp.'s earnings in the fourth quarter declined 89%, resulting in a 28% drop for the year. The company blamed weakening market conditions and shutdowns at its pulp and paperboard operations for this decline. "The widespread deterioration in wood products markets since mid-1990 worsened during the fourth quarter and caused lumber and panel product sales realizations to drop significantly," according to Richard B. Madden, chairman and CEO. ■

Red ink grows for Canadian paper industry

With the deteriorating markets for market pulp and lumber and the continuing handicap of a strong dollar, the Canadian paper industry plunged deeper into the red in the fourth quarter—not to mention the still depressed markets for newsprint, strikes, a domestic recession, and some large year-end writeoffs. A *Pulp & Paper Week* survey of the financial results from 16 Canadian companies showed a total net loss of C$219.2 million in fourth-quarter 1990, compared with a profit of C$202.7 million in the same quarter a year earlier.

Sales in the fourth quarter were down 15.0% to C$4.9 billion compared with a year earlier (the total industry profit figure excludes Domtar Inc., which incurred pretax charges of C$334 million from the writedown of certain assets in the fourth quarter).

For all of 1990, earnings totaled C$37.4 million for the companies surveyed, excluding Domtar, compared with profits of C$1.18 billion in 1989. This was the worst performance for Canadian producers since the 1982 recession, when the industry last ran at a deficit.

In response to the squeeze on cash flow, Canadian producers have been scaling back on already-trimmed capital spending plans, suspending dividends to shareholders, laying off workers, and shutting down operations. Most companies continued to predict that difficult market conditions for most grades will continue through at least the first half of 1991, with some possible improvement in the second half. Nevertheless, some assessments on the outlook for 1991 were fairly pessimistic. Canfor Corp., for example, said it is "unlikely to be profitable in 1991." And MacMillan Bloedel Ltd. CEO Bob Findlay said that "1990 was a difficult year, and unfortunately 1991 may not be any better."

Strikes and writedowns in East. While the eastern Canadian industry benefited from the successful June newsprint price hike, this was offset by the continuing strength of the Canadian dollar, strikes at various mills, and deteriorating markets for most other grades. The Canadian dollar ended the year at 86¢ to the U.S. dollar, about where it began the fourth quarter. A north-of-the-border recession that began in second-quarter 1990 hurt domestic Canadian demand for such grades as containerboard and printing/writing paper, which are produced mainly in the East. In addition, a number of companies took writeoffs partly related to the closure of smaller, older facilities in eastern Canada.

Abitibi-Price Inc. reported a net loss of C$28.9 million, compared with a loss of $14.5 million in fourth-quarter 1989 (after special charges in both periods). The annual loss amounted to $44.6 million, compared with a profit of $54.2 million in 1989 (again reduced by special charges in both years). Abitibi said it would be "a substantial challenge" to improve earnings in any of its businesses as long as the economy and markets remain weak. Despite a healthy balance sheet, "cash flow remains a real concern as the company faces recycling and environmental expenditures that provide little or no return on investment."

Canadian Pacific Forest Products Ltd. cited reduced shipment volumes in all business sectors, except for white paper. The company was also severely hit by labor strikes at three newsprint mills. The strikes may have bolstered the newsprint price hike, but CP Forest reaped little of the reward. Fourth-quarter losses totaled $21.9 million, compared with a $37-million gain in 1989. The annual loss was $9.4 million, compared with a $220-million profit in 1989. The company also noted equity losses at two new joint-venture newsprint mills. CPFP recently said it was closing its R&D operation in Hawkesbury, Ont., on Apr. 19. The restructuring move will affect 63 employees.

Noranda Forest Inc. reported a loss of $95 million for all of 1990 vs a profit of $189 million in 1989. Since not much improvement is expected during the first half, the company said it is "working aggressively to reduce costs, to cut discretionary expenditures, to reduce inventories, and to contain debt." Noranda's capital spending was cut 30% in 1990 to $569 million, with a similar reduction planned for this year. Domtar Inc. lost $273 million in fourth-quarter 1990, compared with a loss of $36 million in 1989. The annual loss was $294 million, compared with a $33-million profit in 1989. The losses include $334 million in pretax charges related

Canadian paper/products results.

	Fourth-quarter 1990 (C$000)			
Companies	**Sales 1990**	**% change 1990/89**	**Earnings 1990**	**% change 1990/89**
Abitibi-Price Inc.[1]	$743,300	−7.2%	$ (28,900)	NM
Canadian Pacific Forest Products Ltd.	415,600	−42.0	(21,800)	NM
Canfor Corp.[1]	211,400	−12.8	(26,100)	NM
Cascades Inc.	212,639	21.0	6,975	−76.7%
Doman	127,422	−23.5	7,305	−7.0
Domtar Inc.[1]	521,000	−12.6	(263,000)	NM
Donohue	155,254	0.4	7,880	−14.7
Fletcher Challenge Canada Ltd.	323,900	−5.2	(1,800)	NM
MacMillan Bloedel Ltd.	695,600	−11.6	(14,200)	NM
Malette (1st Q)	25,588	−34.6	(78,000)	NM
Noranda Forest Inc.	1,051,000	−15.2	(57,000)	NM
Repap Enterprises Corp. Inc.	306,200	−13.3	(9,100)	NM
Scott Paper Ltd.	106,997	−4.9	2,446	−66.6
Tembec Inc. (1st Q)	61,175	5.8	1,749	−71.2
Weldwood of Canada Ltd.	165,700	−6.6	(8,700)	NM
West Fraser Timber	115,000	−11.5	(5,400)	NM
Total	**$5,122,775**	**−14.0%**	**$(219,345)**	**NM**

Net income after taxes, from continuing operations. ( ) = losses. NM = Not meaningful.

1. **Abitibi Price Inc.** 1990 earnings include a loss of C$11.5 million for unspecified unusual items. 1989 results include a loss of C$31.2 million for unspecified unusual items. **Canfor Corp.** 1990 results include a C$8.5-million charge. **Domtar Inc.** Because of massive restructuring charges and other nonrecurring items, 1990 earnings results were not included in the industry total. **Fletcher Challenge Canada Ltd.** 1990 results include a tax credit of C$7.8 million.

to restructuring and writedowns of certain assets.

"Basically, they're going into a survival mode," analyst Stephen Atkinson of Deacon Barclays de Zoete Wedd told *The Globe and Mail.* "They're slashing employment and shutting down operations."

For fourth-quarter 1990, Cascades Inc. reported a decline of 77% in consolidated net earnings, but sales rose 21% in the quarter and 20% for the year to C$818.1 million. Annual profits declined 33% in 1990 to C$20.1 million. More than half of Cascades' 1990 profit comes from its European division, which has turned around ailing carton mills in France, Belgium, and Sweden. The company said it is also poised to buy a Hungarian carton manufacturer for about C$50 million. Cascades will operate the mill and initially own a 20% stake.

The Port Cartier, Que., bleached chemi-thermomechanical pulp mill lost $20 million last year and is headed for an equally large loss in 1991, said Cascades CEO Bernard Lemaire, whose company owns the troubled mill along with Quebec government agency Rexfor. In December, each company injected C$13.3 million in a decision to keep the operation afloat after having shut the mill down earlier in the month. But the future of the 180,000-metric-tpy mill located on Quebec's depressed North Shore remains in question, serving as a thorn in an otherwise fairly bright outlook for the company.

Lumber markets, pulp hurt West. The marked deterioration of northern softwood market pulp prices in the second half of 1990 and the continued decline in demand for wood products added to the gloom in the western Canadian pulp and paper industry.

MacMillan Bloedel reported a loss of $14.2 million for the fourth quarter, which brought its total profits for the year to $50.8 million, down from $246.7 million a year earlier. "During 1990, Canadian companies were more severely impacted by the recession than their U.S. competition due to higher labor costs and a strong Canadian dollar," Findlay explained. "Labor cost increases in the Canadian forest industry over the last four years have averaged 4% more than U.S. increases. At the same time, the Canadian dollar moved from the 72¢ level to as high as 88¢—a 22% increase. With the majority of the industry's products being sold in U.S. dollars, this means that by the 1990s we were receiving about 20% less for our products than we did in 1986.

"These competitive disadvantages make cost reduction and a margin-added strategy critical if the industry is to remain viable," Findlay said. ■

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LABOR

Rothesay Paper strike ends after ten months

About 150 workers will lose their jobs at Rothesay Paper Ltd. in St. John, N.B., as part of a contract agreement in February that ended a long and bitter strike by over 400 members of Canadian Paperworkers Union Local 601. Despite the settlement, workers had not returned to their positions as of early March as details of the layoff plan were worked out. The newsprint mill continues to operate at about 80% to 90% capacity, and a union representative said workers would probably not return for a couple of weeks. Rothesay is operated by Irving Pulp & Paper Ltd.

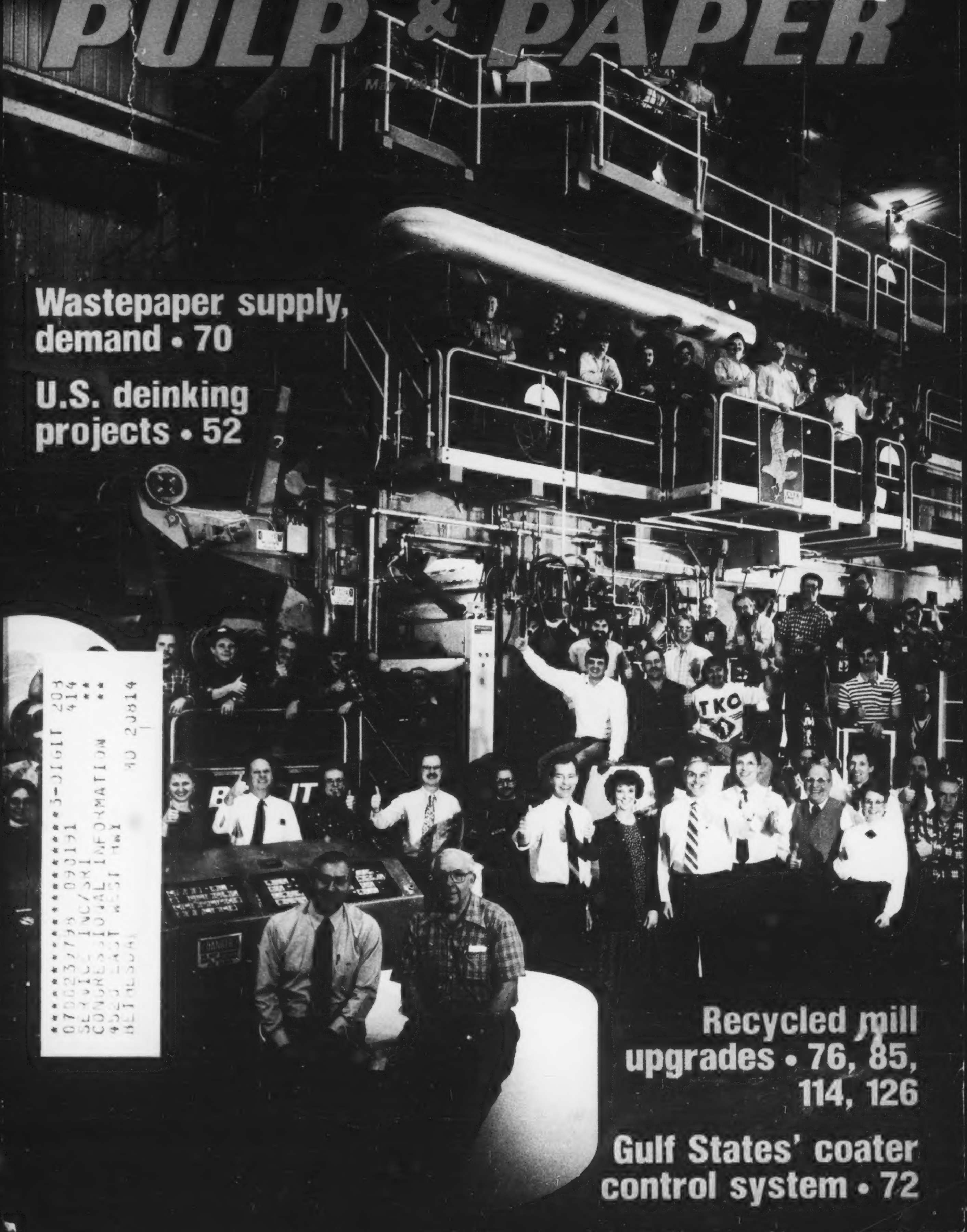
With 391 of 430 union members voting on Feb. 24, the contract was ratified by a 58% majority. The contract runs until April 1994 and calls for wage increases of C85¢ in 1990, 5.5% in 1991 and 1992, and 6.0% in 1993. The slim margin of ratification probably reflected the votes of those who were going to lose their jobs. As part of a "golden handshake" plan, workers over age 55 will not return to the mill. The strike was not officially related to the pattern contract bargaining that took place last year, but the new contract contains pattern items that allow the company to operate the mill on two additional holidays as well as giving management greater flexibility in assigning work to tradesmen. Rothesay recently closed its stone groundwood pulp mill in St. John and plans to begin production of thermomechanical pulp by mid-year.

Local 601 maintenance workers struck the mill Apr. 9, 1990, at the same time that members of CPU Local 786 struck Irving's nearby tissue mill. That strike ended in May, while a walkout by CPU Local 907 paperworkers in support of Local 601 was stopped after the 105 employees were court-ordered back to their jobs in the paper mill. The contract for Local 907 expires in June. CPU officials said a boycott against Irving products in eastern Canada sponsored by the Canadian Labour Congress was instrumental in getting the sides back together at the table. Irving products include oil, gasoline, and food items. "There's no doubt in our minds that Irving didn't want a boycott, that it would damage their image," said a CPU spokesman.

- The members of the International Woodworkers Assn. of Canada were on strike at Abitibi-Price Inc.'s woodlands operations in Thunder Bay, Ont. Between 150 and 200 workers went on strike the first week of February over fiber supply issues, a company spokeswoman said. ■

PULP & PAPER

May 1991



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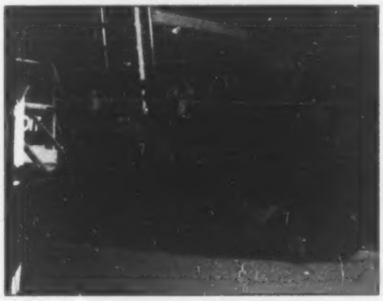

THE COVER

Wisconsin Tissue's recent recycling expansion at Menasha, Wis., (see article on p. 126) featured a new paper machine, converting facilities, and waste treatment operation as well as an expanded deinking plant. **(Photo of mill employees at the new No. 4 paper machine courtesy of Wisconsin Tissue.)**

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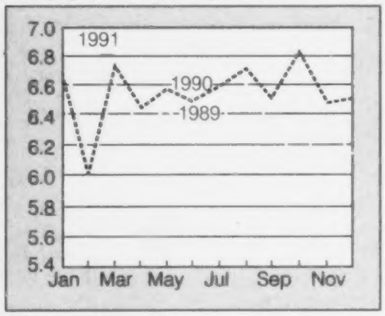
ABP

BPA

MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.1 million tons in February, according to the American Paper Institute, down 0.1% from the same month last year. The seasonally adjusted rate of production stood at 78.4 million tpy, down about 900,000 tpy from the rate in January. Paperboard production was up 4.2% through February, but paper output dragged the total down with a 2.6% decline.

Among major grades, lower shipments to magazine publishers and stationery manufacturers cut printing and writing paper shipments 5.0% compared with last year, despite improved demand from book publishers and reprographics users. Uncoated free-sheet fell 5.5% as a result of weak shipments to commercial printers and envelope makers. Containerboard production for the domestic market was up 5.3%, but the strong inventory building evident from October to January ended with a scant 0.1% gain in February. Production of containerboard for the export market remained strong with a 9.9% gain.

Canadian newsprint shipments totaled 698,000 metric tons in February, down 2.8% from a year earlier, while woodpulp shipments climbed 12.8% to 689,000 tons. Operating rates stood at 97% for both newsprint and market pulp mills. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Feb.	522	2.4	6,586	3.3
Uncoated groundwood (s)	Feb.	132	-7.0	1,658	-6.7
Coated paper (s)	Feb.	564	-2.4	7,184	-2.9
Uncoated free-sheet (s)	Feb.	846	-9.0	10,968	-5.5
Other printing/writing	Feb.	119	-9.2	1,498	-4.3
Total packaging and other paper (s)	Feb.	360	-0.8	4,490	-1.3
Tissue	Feb.	438	-3.1	5,540	-0.2
Total paper	**Feb.**	**2,981**	**-4.0**	**37,923**	**-2.6**
Unbleached kraft paperboard	Feb.	1,624	5.7	20,684	7.0
Semichemical medium	Feb.	453	5.3	5,708	3.5
Bleached paperboard	Feb.	359	0.8	4,509	1.7
Recycled paperboard	Feb.	677	0.0	8,568	-0.1
Total paperboard	**Feb.**	**3,113**	**3.8**	**39,469**	**4.2**
Total U.S. paper and paperboard output	**Feb.**	**6,094**	**-0.1**	**77,393**	**0.8**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Jan.	5,541	1.1	66,491	1.8
Market pulp production	Jan.	763	-0.9	9,155	-1.3
Wastepaper consumption at paper/board mills	Jan.	1,833	3.7	21,996	5.2
Pulpwood consumption (cords)	Jan.	8,801	2.9	106,612	2.9
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft^2)	Feb.	23.890	-1.2	51.117[6]	-1.3
Containerboard inventories at U.S. box plants and mills	Feb. 1	2,713	14.9		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Jan.	1,106	-0.6	13,272	-0.6
Imports of Canadian newsprint	Jan.	693	-0.3	8,321[6]	-0.2
U.S. paper exports (including products)	Jan.	646	11.2	7,756	11.2
Exports of unbleached kraft linerboard	Jan.	250	13.6	3,004	14.1
Exports of woodpulp	Jan.	475	13.1	5,706	13.2
Norscan pulp inventories[4]	Feb. 28	1,595	8.1		
Norscan pulp operating rates[4]	Feb.	96 %	88 %	82 %	n.a.
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Feb.	698	-2.8	1,463[6]	2.0
Operating rates	Feb.	97 %	94 %	97 %	94 %
Inventories held by U.S. consumers	Feb. 28	n.a.			
Other paper/board shipments	Feb.	561	0.7	1,164	33.8
Woodpulp shipments (export only)	Feb.	689	12.8	1,380	12.7
Operating rates	Feb.	97 %	94 %	93 %	94 %

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Coated groundwood: Long-term outlook better than short-term activity

Grade structure: Coated paper with 10% or more mechanical pulp is designated coated groundwood and often is referred to as lightweight coated (LWC), though basis weights for LWC are typically 40 lb or less (sometimes 45 lb). Basis weights can go higher. Most coated groundwood is coated two side (C2S). Coated groundwood paper represented 56% of all U.S. coated paper shipments in 1990.

Coated groundwood grades are classified mostly as Nos. 4 and 5, the latter being the lowest in quality and price. Roughly half of all No. 4 papers produced are groundwood, and virtually all of No. 5 is groundwood. No. 5 papers make up about 49% of the total U.S. coated paper produced. Canada recently expanded its presence in coated paper. Slightly more than 15% of total Canadian printing/writing paper production (uncoated groundwood, uncoated free-sheet, and coated) is coated paper.

Coated groundwood paper is commonly made in the 32- to 50-lb range (25 × 38 in. in reams of 500), although basis weights can run as low as 26 lb and as high as 70 lb. End uses include magazines, Sunday newspaper supplements, catalogs, newspaper inserts, directories, books, and advertising flyers. Coating weight is about 30% of total sheet weight for LWC paper.

Developments in the industry include lower basis weights and introduction of recycled-content coated groundwood paper. Also important was a complaint of dumping filed by U.S. producers against European mills. So far, the complaint has been upheld by the U.S. government agencies reviewing the case.

Production/capacity: Ten leading coated groundwood producers represent 80% of North American capacity. The five largest coated groundwood producers are Champion International Corp., International Paper Co., Consolidated Papers Inc., Repap Enterprises Inc., and Blandin Paper Co. The American Paper Institute projects U.S. coated groundwood capacity will rise in small increments through 1993, topping out at just over 4.6 million tons that year, up from just under 4.6 million tons in 1992.

Most new major coated groundwood capacity had been brought online by the end of 1990, with the next major addition being Boise Cascade Corp.'s 320,000-tpy machine at Rumford, Maine, scheduled for completion in 1994.

Coated groundwood capacity in Canada was 419,000 tpy in 1989 and 584,000 tpy in 1990 and is projected to rise to 645,000 tpy in 1991 and 678,000 tpy by 1992.

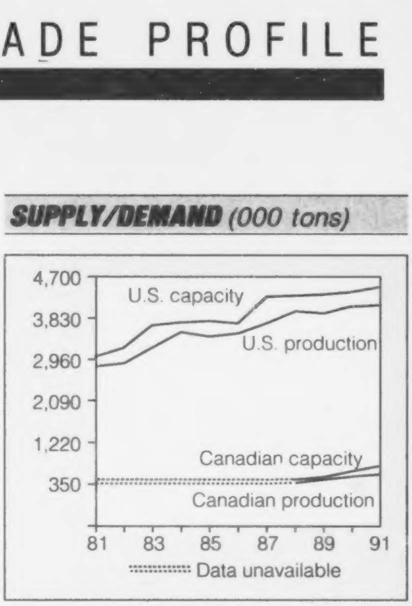
Low-quality coated groundwood grades generally compete with uncoated groundwood papers and have also experienced moderate capacity growth; on the high end, they compete with coated free-sheet papers, which have undergone rapid expansion in recent years and are sometimes available at such cheap prices that customers can easily move up to coated free-sheet from groundwood grades.

Outlook: Magazine publishers and printers purchase about 51% of the total coated groundwood paper produced in the U.S. Magazines and periodicals have been suffering from the effects of economic recession and retargeting of advertising dollars. Magazine ad pages fell 3.7% in 1990 compared with 1989. Similarly, newspaper supplements lost 7.1% in ad pages in 1990.

Coated groundwood as a percentage of total magazine tonnage has been declining slightly, though the total amount of paper continues to increase. In 1989, coated groundwood paper represented 73% of all paper consumed by U.S. magazines but was forecasted to drop to 72% in 1990 and 1991, according to the Magazine Publishers of America. Publishers will increase their use of 32 lb and 40 lb at the expense of weights in between.

Prices: Historical transaction pricing trends ($/short ton, year-end) for coated groundwood paper (34-lb, No. 5 roto paper) are as follows: 1987, $890; 1988, $990; 1989, $966; 1990, $940. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1989	1990	1991e
Production[1]	4,059	4,214	4,303
Capacity[2]	4,341	4,398	4,553
Utilization rate	93.5%	95.8%	94.5%
Imports	539	660	650
Exports	116	140	150
Apparent U.S. consumption	4,482	4,734	4,803
lb/capita	35.97	37.81	38.36
GNP ratio[3]	1.09	1.14	1.13
Canada			
Production[4]	377	501	563
Capacity[4]	419	584	645
Utilization rate	90.0%	85.8%	87.3%
Imports	94	98	100
Exports[4,5]	422	561	583
Consumption[4]	190	207	215

r = revised. 1. *Pulp & Paper* estimates. 2. American Paper Institute. 3. $ billion/real GNP (1982). 4. Canadian Pulp & Paper Assn. 5. More than 95% to U.S.

TOP NORTH AMERICAN PRODUCERS

	Annual capacity (000 tons)	Market share (%)
1. Champion International	720	13.9
2. International Paper[1]	620	11.9
3. Consolidated Papers[1]	580	11.2
4. Repap Enterprises	525	10.1
5. Blandin Paper[2]	335	6.4
6. Bowater	325	6.3
7. Mead	310	6.0
8. Boise Cascade	285	5.5
9. James River	260	5.0
10. Pentair[3]	220	4.2

Capacity share of top five companies:
53.3%

Capacity share of top ten companies:
80.4%

North American capacity (1991):
5.198 million tons

1. *Pulp & Paper* estimate. 2. Subsidiary of Fletcher Challenge Canada Ltd. 3. Niagara, Wis.

New Deinking Projects Proliferate as Industry Meets Recycling Demand

Despite industry downturn and capital spending cuts, North American pulp and paper companies continue to invest in deinking plants

By MARY CORBETT, News Editor

The North American paper industry continues to demonstrate its commitment to using increased amounts of recycled fiber by the abundance of deinking projects planned or proposed to start up in the next couple of years. At least 45 deinking projects will start up in 1991 at new or existing mills, adding 2,879,825 mtpy recycled fiber capacity.

Although many paper companies have cut back on capital spending plans for this year, they are continuing to invest in secondary fiber projects. This is largely due to legislation requiring increased recycled fiber content in newsprint but also because using secondary fiber is becoming more economically viable and more customers are demanding it in tissue and fine paper as well as newsprint and packaging grades.

Commenting on the American Paper Institute's (API) recent capacity survey, president Red Cavaney said, "The steeper rise in paper and paperboard capacity relative to that of total woodpulp reflects the industry's commitment to the increased use of recovered wastepaper as a papermaking fiber."

DEINKING WASTEPAPER SUPPLY. Demand for old magazines (OMG) for use in deinking is increasing, as improved technology removes processing obstacles, such as dealing with difficult-to-disperse stickies and inks that adhere to paper coating. OMG does have benefits in the deinking process for some grades. Clay in OMG stabilizes the bubbles in the flotation process, long fibers in OMG add strength to the next generation of paper, and brightness is generally higher.

OMG is most commonly used in containerboard, combination folding boxboard, and industrial packaging but is finding increased use in newsprint, tissue, and some fine writing paper. ONP will show the greatest percentage gain in consumption of all the grades through 1992 due to the rapid growth in recycled newsprint production slated to come onstream through 1992.

The strong economic advantages in using recycled fiber for tissue, containerboard, and newsprint are not yet clear for printing and writing paper, although environmental motivations may create markets for these grades. To secure a source for what may become a required raw material in the future, mills must establish a good working relationship with local collection services or offices.

Projects listed in Table 1 are definite or very likely to move ahead, pending approval. Many more companies have indefinite plans to install deinking facilities, or they have put projects on hold because of capital limitations at this time. Addition or expansion of deinking capability is often tied to papermaking capacity expansion. Thus, a few companies have postponed deinking facilities along with new paper machines.

Jefferson Smurfit Corp. has put on hold a second recycled newsprint machine along with deinking equipment and a new cogeneration facility at its Pomona, Calif., mill, acquired from Golden State Newsprint last year. The mill is currently in the middle of a two-year, $35-million capital spending program aimed at improving newsprint quality and raising output 10% to 15% but has put any further expansion on indefinite hold.

Smurfit is also in the final round of site selection for a New York State recycled newsprint mill with a deinking plant to start up in 1994. Canadian companies that have postponed projects or kept them on hold include Boise Cascade Canada Ltd., Stone-Consolidated Inc., F.F. Soucy Inc., and Stora Forest Industries Ltd.

Most of the deinking projects to come online this year continue to be in newsprint or market deinked pulp mills that sell to newsprint manufacturers, but projects for other grades, particularly tissue, are increasing.

NEWSPRINT. Recycled newsprint capacity is projected to increase by 150% by the end of 1991; 30% of that capacity will contain at least 40% recycled fiber by the end of 1992, and 85% will be at existing mills that have added deinking capacity to replace virgin-fiber pulping capacity. The remaining 15% will come from greenfield newsprint mills now under construction.

Ten new deinking facilities will start up this year, adding 1,009,825 tpy of recycled fiber capacity. Eight will start up in 1992, adding another 784,350 tpy. Four of these are market deinked pulp mills that would sell

TABLE 1: **U.S. and Canadian deinking projects.**

Company/mill/site	Startup	Deinking capacity (mtpy)	Recycled fiber content (%)	Recycled furnish requirements (mtpy)	Grades
Newsprint					
Abitibi-Price, Thunder Bay, Ont.	May '92	55,000	40	76,550	70% ONP, 30% OMG
Alabama River Newsprint, Claiborne, Ala.	spring '92	100,000	45	140,000	70% ONP, 30% OMG
Atlantic Newsprint, Whitby, Ont.	Jan. '91[1]	146,000	100	73,000	70% ONP, 30% OMG
Augusta Newsprint, Augusta, Ga.	Mar. '91[2]	86,750	variable	115,000	70% ONP, 30% OMG
Bear Island, Ashland, Va.	late '92[3]	43,500	20	60,000	ONP, OMG
Boise Cascade, W. Tacoma, Wash.	1992	70,000	40	109,500	ONP, OMG
Bowater, Calhoun, Tenn.	Sept. '91	109,500	variable	138,700	70% ONP, 30% OMG
Canadian Pacific Forest Products, Gatineau, Que.	late '91	182,500	variable	182,500	70% ONP, 30% OMG
Canadian Pacific Forest Products, Thunder Bay, Ont.	late '91	100,375	variable	100,375	70% ONP, 30% OMG
Cascades/Donohue/Maclaren, Cap de la Madeleine, Que.	early '92	90,000	20	112,900	70% ONP, 30% OMG
Champion International, Sheldon, Texas	1992	138,800	n.a.	208,200	ONP, OMG
Daishowa Forest, Quebec City, Que.[4]	Feb. '92	110,000	variable	120,000	80% ONP, 20% OMG
Daishowa Forest, Port Angeles, Wash.[4]	spring '92	65,000	variable	75,000	50% ONP, 10% OMG, 40% old directories
Inland Empire, Millwood, Wash.	late '91	37,000	40	42,000	ONP
Kruger, Bromptonville, Que.	1992	41,640[6]	variable	52,050	ONP, OMG
Newstech Recycling, Vancouver, B.C.	Nov. '91	122,300	variable	140,000	70% ONP, 30% OMG
North Pacific Paper, Longview, Wash.	Apr. '91	156,000	variable	225,550	ONP
Smurfit Newsprint, N.Y. State (site not chosen)	1994	n.a.	n.a.	n.a.	n.a.
Stone-Consolidated, Shawinigan, Que. (under study)	n.a.	70,000	variable	83,000	70% ONP, 30% OMG
(Indefinite)					
Alberta Newsprint, Whitecourt, Alta.	n.a.	n.a.	n.a.	n.a.	n.a.
Fletcher Challenge, Elk Falls and Crofton, B.C.	n.a.	n.a.	n.a.	n.a.	n.a.
Georgia-Pacific, E. Millinocket, Maine	n.a.	86,750	variable	120,000	ONP,OMG
Manistique (Kruger)[7], Manistique, Mich.	proposed	34,700	100	n.a.	OMG, books, inserts, catalogues
Kenaf Paper, Raymondville, Texas	n.a.	n.a.	n.a.	n.a.	n.a.
Tissue					
Scott, Owensboro, Ky.	proposed	n.a.	n.a.	n.a.	n.a.
Perkins Papers, Candiac, Que.	Aug. '91	48,500	100	100,000	ledger (woodfree)
Atlas Paper, Hialeah, Fla.	June '91	21,000	100	29,200	white leger coated book
Putney Paper, Putney, Vt.	Feb. '91	15,000	100	9,100	white ledger coated book
Marcal Paper, Elmwood, N.J.	n.a.	n.a.	n.a.	n.a.	n.a.
Bay West (Mosinee), Middletown, Ohio	1991	79,810	100	120,000	postconsumer
Fort Howard, Rincon, Ga.	1991	n.a.	100	n.a.	n.a.
American Power, Bala Cynwyd, Pa.	1993	138,800	n.a.	173,500	postconsumer
Orford Recycling, Drummondville, Que.	n.a.	120,000	n.a.	n.a.	n.a.
Fox River Fiber, De Pere, Wis.	July '91	69,400	n.a.	109,500	ledger grades
Mississippi River Corp., Natchez, Miss.	Jan. '91	n.a.	n.a.	n.a.	n.a.
Caithness King, Pejepscot, Maine	1993	190,850	n.a.	273,750	50% ONP, 50% OMG
Caithness King, Midland, Mich.	1992	190,850	n.a.	273,750	50% ONP, 50% OMG
Ponderosa, New York, N.Y.	n.a.	n.a.	n.a.	n.a.	n.a.
Ponderosa, Augusta, Ga.	1992	34,700	n.a.	n.a.	n.a.
Ponderosa, Oshkosh, Wis.	1992	34,700	n.a.	n.a.	n.a.
Ponderosa, Memphis, Tenn.	1992	34,700	n.a.	n.a.	n.a.
Printing/Writing					
Noranda Inc., Thorold, Ont.	proposed	120,000	50 to 100	144,000	ledger, office waste
Noranda Forest Recycled Papers, Thorold, Ont.	1991	32,965	variable	36,500	postconsumer
Patriot Paper, Boston, Mass.[5]	Aug. '91	34,700	100	40,150	white office waste
Riverside Paper, De Pere, Wis.	n.a.	n.a.	n.a.	n.a.	n.a.

1. Will reach full capacity by September '91.
2. Date it will reach full capacity.
3. An additional 410,000 tpy capacity using 200,000 tpy of wastepaper (40%) will come online by 1995 or '96.
4. Produces newsprint and directory paper.
5. An additional 100,000 tpy will come online by 1995.
6. Expansion of existing facilities.
7. Also produces groundwood specialty grades.

their output to existing newsprint mills.

In the U.S. Southeast, Augusta Newsprint Co.'s deinking line at its Augusta, Ga., mill is nearly up to its full capacity of 250 tpd (see article, p. 76). The deinked pulp will enable either of the mill's two paper machines to make up to 40% recycled-content newsprint and can be varied according to a customer's specifications. The $27-million deinking line was purchased from Black Clawson and uses a flotation system with some washing. It will use a mix of 70% ONP and 30% OMG, totaling about 115,000 tpy of wastepaper, which will be obtained from both municipal and private sources.

Alabama River Newsprint Co. in Claiborne, Ala., plans a second-quarter 1992 startup for its $56-million deinking facility. The plant will produce 100,000 tpy of deinked pulp to supply its 220,000 tpy of newsprint with a 45% recycled fiber furnish. The combination flotation and washing system will make use of about 140,000 tpy of ONP and OMG sourced partly from wastepaper brokers and partly from municipal reclamation systems. Parsons & Whittemore and H.A. Simons are currently doing the engineering, and suppliers are being chosen.

> *"These companies [that include a percentage of recycled fiber] will be in a much better position than if they sit and wait until the legislation comes along and says include 60% recycled fiber."*

Bowater Southern's Calhoun, Tenn., deinking plant is under construction and will start up in September. The plant will make 109,500 tpy of deinked pulp, using 138,700 tpy of ONP and OMG that is sourced from wastepaper brokers. The $74.5-million facility includes a dual flotation and washing system on alkaline, then on acid, by Black Clawson and a pulping drum by Ahlstrom. The engineering was done by CRS Sirrine. The sludge and ash generated by the facility will be landfilled, although boiler capacity may be increased in the future so the waste can be burned.

In the Northwest, Inland Empire Paper Co. is installing a new deinking plant at its 66,000-tpy newsprint mill in Millwood, Wash. It will use 42,000 tpy of ONP to produce 37,000 tpy of deinked pulp. The company may have to go a considerable distance to find sources of ONP because North Pacific Paper Co. planned to start up a 156,000-tpy deinked pulp facility in Longview, Wash., in April. North Pacific, a joint venture of Weyerhaeuser Co. and Jujo Paper Co. Ltd., will source its 225,550 tpy of ONP through Weyerhaeuser. The deinking line is tied to a third paper machine, which will bring total capacity to 2,000 tpd of variable recycled-fiber content newsprint.

Daishowa America Co. Ltd. is starting up a $40-million, 65,000-tpy deinked pulp facility at Port Angeles, Wash., in spring 1992. The facility will use 50% ONP, 40% old directories, and 10% OMG for its newsprint/directory mill. Daishowa has developed its own top secret deinking technology, which will enable it to use old directory paper. A spokesperson for the company did say it is a combination flotation and washing system. Daishowa is also building a deinking facility at its Quebec City, Que., newsprint/directory paper mill. This facility will use 120,000 tpy of wastepaper from Canada and the U.S. (80% ONP and 20% OMG) to produce 110,000 tpy of deinked pulp. The recycled fiber content can be varied according to a customer's needs.

Atlantic Packaging Products Ltd. in Whitby, Ont., is starting up its 146,000-tpy deinked pulp line. It uses 73,000 tpy of ONP and OMG sourced from community recycling programs. Voith provided the engineering and supplied the combination flotation and washing system. The company is not yet up to full capacity on its 400-tpd paper machine, which produces 100% recycled newsprint.

DEINKED PULP. Legislation is driving newsprint makers to include high recycled-fiber content, but those who cannot afford to build their own deinking facilities may come to depend on market deinked pulp manufacturers. Paul Stern, Caithness King Co.'s environmental scientist, said, "A lot of publishers are under pressure from their readers to come up with recycled-fiber content paper. We believe companies will be to an advantage to begin now proactively including a percentage of recycled fiber. These companies will be in a much better position than if they sit and wait until the legislation comes along and says include 60% recycled fiber."

Market deinked pulp manufacturers are confident there will be a continued demand for recycled content and that the most efficient and economical way to provide it, for mills that don't have a tremendous need, is with deinked market pulp. Stern said, "It's either a make or buy decision. At our economy of scale we can sell them the pulp for a lot cheaper than if they had to make it themselves."

Caithness King is building two nearly identical market deinked pulp facilities—one in Midland, Mich., and the other in Pejepscot, Maine. Both projects will produce 550 tpd of deinked pulp, using 750 tpd of wastepaper—50% ONP and 50% OMG. Construction will begin in Michigan in July, and the plant will start up 1992. The Maine mill will start up in 1993. Bechtel is doing the engineering and suppliers are currently being chosen. Customers are being sought in production of value-added grades, such as directory, SCA, SCD, and coated Nos. 4 and 5, but no contracts are finalized. The process is a multi-stage washing and flotation system using hydrogen peroxide and sodium hydrosulfite for brightness.

Ponderosa Fibres of America Inc., North America's largest market deinked pulp producer, is planning 100-tpd expansions at three mills (Augusta, Ga., Oshkosh, Wis., and Memphis, Tenn.) and has proposed a new mill for the New York City area. The company is experiencing increasing demand for its product from printing/writing, tissue, and other specialty grade manufacturers. It considers itself at an advantage since anticipated legislation is prompting papermakers to use more recycled fiber, but many cannot afford to build deinking facilities. The company currently makes 700 tpd of deinked market pulp at four mills using primarily colored ledger, white ledger, and poly-coated board.

PRINTING/WRITING. A lack of federal guidelines and the problems with a clean source of secondary fiber in printing/writing paper have caused these grades to lag behind tissue and newsprint in secondary fiber usage. Before these manufacturers make the investment in deinking facilities they must be assured that a dependable source of quality wastepaper, such as office waste, is available.

Recyclable paper products account for approximately two-thirds of all office waste, yet improper sorting may cause contaminants (glues, tape) or paper of unacceptable quality to enter the deinking process. The situation is improving as offices and commercial buildings are jumping on the recycling bandwagon. Source separation is the key factor in the effective utilization of office waste. Pickup is often supplied free by waste collection groups, and companies may save on waste disposal costs. Also, office workers are demanding that recycling bins be made available.

Noranda Forest Inc. has created a new division called Noranda Forest Recycled Papers to handle its recycling efforts at its integrated Thorold, Ont., mill, which includes three paper machines and a deinking facility. The company is currently implementing process changes to bring the capacity up to about 95 tpd from 25 tpd last year and will use about 150 tpd of wastepaper by the end of 1991.

Don Duncan, vice president-operations at the mill, said that until last year the company had not been selling the paper as recycled. "By making the move to become an Eco-Logo qualified producer with 50% deinked fiber, it has allowed us to put far more through that deinked plant and maintain quality. It's interesting that the dirt specks that used to be a problem in the past are no longer a problem now that we're selling it as recycled paper."

The company had announced plans more than a year ago to construct a 120,000-tpy greenfield wet-lap deinking facility in Thorold, but that project will now be considered separately, falling under Noranda Inc. Duncan said the company is not prepared to make such a large investment at this time, and it wants to try introducing new products through the integrated facility first. The proposed new facility would consume approximately 144,000 tpy of ledger and sorted office waste to produce a sheet with 50% to 100% recycled fiber content and would also sell market pulp. Duncan said since the product produced by the new greenfield facility will compete on the pulp market, that investment will involve a long-term look.

TISSUE. More than half of the tissue supply coming onstream from 1990 to 1993 will make use of deinked wastepaper, as more tissue makers turn to 100% recycled in response to environmental pressures, procurement guidelines, and customer demand. According to API's 1990 capacity survey, eight new tissue machines will come onstream between 1990 and 1993, raising capacity from 5.976 million short tons to 6.349 million short tons. Four of these machines will use deinked wastepaper to make tissue.

Three-quarters of the recycled fiber furnish used in tissue production is supplied from pulp substitutes and high-grade deinking grades; mixed paper, ONP, and OCC provide the rest. Fort Howard Corp., Chesapeake Corp., Pope & Talbot Inc., and FSC Paper Co. make only 100% recycled tissue, while Scott Paper Co., James River Corp., Procter & Gamble Paper Products Co., and Georgia-Pacific Corp. include an average of 20% wastepaper in their tissue.

Construction began last spring on a 48,500-tpy deinking facility at Perkins Paper Ltd.'s Candiac, Que., tissue mill. The facility will start up Aug. 1 in conjunction with a new Valmet twin-wire, 6,500-fpm tissue machine. The combination flotation and washing system includes equipment from Hymac, Black Clawson, Fiberprep, and Escher Wyss and was engineered by Joseph Miller Consultants of Montreal. The facility will make use of 100,000 tpy of woodfree wastepaper sourced from Montreal and Toronto as well as the northeastern U.S. Perkins has been making 100% recycled tissue since 1971.

Mosinee Paper Corp. is expanding its Bay West subsidiary in Middletown, Ohio, including a $17-million deinking plant, due to be completed in third-quarter 1991. When added to the existing 100-tpd plant, the combined operation will produce 330 tpd of recycled pulp for the mill's towel and tissue machines. The mill will use 450 tpd of varying grades of postconsumer waste.

A couple of small tissue manufacturers are expanding deinking capability. Putney Paper Co. in Putney, Vt., raised its capacity 40% last year to about 50 tpd with a machine rebuild. The expanded deinking system will produce about 44 tpd of deinked pulp for its 100% recycled tissue. Escher Wyss supplied the flotation system. Atlas Tissue Mills in Hialeah, Fla., is in the startup phase of a new flotation deinking line from Black Clawson. It will use 80 tpd of ledger and coated book wastepaper to produce 100% recycled tissue. ■

Wastepaper Market on Rocky Road: Unusual Conditions Impede Recovery

U.S. wastepaper markets have never experienced the changes and challenges they are presently, while long-term prospects are even more uncertain

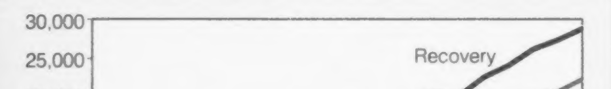
By DEBRA A. GARCIA, Senior News Editor

Pick almost any facet of the wastepaper market today, and it will have changed remarkably in the space of just a couple of years. Since the latter part of the 1980s, the business of collecting, sorting, baling, shipping, selling, and consuming wastepaper has undergone drastic adjustments. This has caused an upheaval the industry has never before experienced—and the transition has just begun. In the next decade, the industry will face even more challenges. How it will fare is anyone's guess.

Since 1987, when public recycling programs began to grow in leaps and bounds, the wastepaper business has gone downhill. It was most noticeable in old newspapers (ONP), the grade that municipal curbside recycling programs have been most successful at generating. The price mills pay for No. 6 newsprint, the lowest ONP grade and the one identified with curbside collections, peaked at $60.00/short ton, f.o.b. seller's dock, in New York, N.Y., in late 1987. Since then prices have fallen steadily to their current level of $0.

Recovery of ONP shot up 86% between 1983 and 1990, according to the American Paper Institute (API). Figures released by API earlier this year indicated that ONP collections were up about 500,000 short tons in 1990 to a record level of 5.9 million tons. This represents a recovery rate of 45% of the 13.3 million tons of newsprint used in the U.S. last year. API expects the recovery rate of ONP to exceed 50% by 1995, when the industry plans to recover 40% of all paper and paperboard it produces. This will mean that total collections will have to increase from the 28.9 million tons reported for 1990 to approximately 40 million tons in 1995.

FIGURE 1: **U.S. wastepaper recovery, consumption, and exports, 1970-90 (000 short tons).**



1. Consumption by U.S. paper and paperboard mills
Source: American Paper Institute

IS 40% RECOVERY ATTAINABLE BY 1995? Achieving this goal will take not only a 5% annual growth in domestic consumption but also a 10% annual growth in exports, according to Bradley N. Currey, president of Rock-Tenn Corp. "Whether this happens is not all under our control, especially exports," he said.

There's no doubt that domestic consumption is on the rise, particularly for such grades as ONP and old corrugated containers (OCC), but export growth will likely hinge on a number of factors that are not entirely predictable. Presently, for instance, the Persian Gulf war has caused a shortage of steamship containers that has put a significant dent in wastepaper exports this year. Rebuilding Kuwait will continue to put a strain on container availability in the foreseeable future. A drop in exports in 1991, after more than a decade of growth (Figure 1), would not be inconceivable given the container situation, and this could cause a glut of paperstock on the domestic market. Given this scenario, prices would continue to fall, and a number of smaller operators in the wastepaper collection business would fail—possibly impeding progress in raising recovery rates.

For mills gearing up to use increasing quantities of wastepaper, future success depends on securing adequate and reliable sources of good-quality wastepaper. In the past two years, many mills have either acquired firms in the wastepaper collection business; signed agreements with recyclers, such as Laidlaw Inc., to handle paperstock procurement; entered into joint ventures with collection companies; or created their own internal procurement divisions.

OCC SHORTAGES ARE BIG CONCERN. One sector of the paper industry that is most worried about future paperstock shortages appears to be containerboard producers. Shortages of OCC, which is used in producing boxboard, corrugating medium, and linerboard, are likely by the mid-1990s. OCC supplies are tight already even at the current 50%-plus recovery rate, and more capacity to consumer OCC is coming onstream. This situation could change, however, if exports of OCC drop. However, both domestic consumption and exports of OCC are expected to grow in 1991. Future growth in OCC collection, though, could be impeded by contaminants such as hot-melt glues, tar tape, and coated, wax, and film laminates, according to Currey.

The tightness in OCC markets has kept prices relatively firm during the current down cycle for wastepaper. Prices in the New York City region, for instance, have declined only about 50% since they peaked in late 1987 at $70 to $80/ton. This compares with a 100% drop in No. 6 newsprint prices during the same period (Table 1). The amount of OCC consumed by domestic paper and paperboard mills in 1990 reached 10.447 million tons, 46.7% of the total wastepaper consumed. Consumption of other grades within the industry was considerably lower, with ONP being the highest at 4.679 million tons, or 20.9% of the total.

During the period 1990-93, total wastepaper consumption is expected to increase at a pace averaging 7.2%/year, more than twice the growth rate of any other fiber source, according to API. By 1993, wastepaper will comprise 29.3% of all fiber consumed by U.S. mills. According to API's 1990 "Paper, Paperboard, Woodpulp Capacity Survey," wastepaper use by the U.S. paper industry will rise from 20.442 million tons in 1989 to 27.148 million tons in 1993.

Consumption growth will be greatest among the lowest grades of wastepaper. OCC consumption is expected to increase at the rate of 6.3%/year for the period 1989-92, reaching 13.298 million tons in 1993. According to API, capacity for recycled linerboard made exclusively from wastepaper or with a high wastepaper content is expected to increase at a high annual rate of just over 39% to reach 1.453 million tons in 1993. Capacity to produce recycled newsprint, meanwhile, will boost ONP consumption almost 50% between 1990 and 1993. During this period, ONP use will rise 9.4%/year to 5.353 million tons.

MIXED PAPER PROVIDES GREATEST CHALLENGE. Perhaps the grade with the greatest potential but the biggest challenge is mixed paper. This category has always contained grades that were too costly to presort and were therefore sold to mills where bulk rather than appearance was a priority, such as in construction grades, setup boxboard, and the underside of clay-coated folding carton. The growth in office presort programs is helping to unmix mixed papers and allow them to be reclassified as higher grades (ledgers, hard whites, etc.). But quality will remain a problem until better programs can be implemented in offices and other collection centers. This would boost demand for these grades from such users as tissue and printing/writing paper producers. API expects mixed paper use in the paper industry to rise from 2.356 million tons in 1989 to 3.007 million tons in 1993.

Growth trends in the remaining two major categories of wastepaper, high-grade deinking and pulp substitutes, will depend largely on how the issue of postconsumer waste is settled.

Consumer groups are advocating that only paper consumed by the end user and tossed out for disposal should be considered as recycled fiber in recycled-content standards being drafted by local, state, and federal legislators. The paper industry, however, argues that preconsumer waste, which includes discards from industry prior to use by the end user, will end up in the solid waste stream if not reused, making the issue of preconsumer vs postconsumer moot.

API projects that mill use of pulp substitutes will grow from 2.889 million tons in 1989 to 3.318 million tons by 1992, while consumption of high-grade deinking will rise from 1.691 million tons to 2.307 million tons during the same three-year period.

The future of the wastepaper business will depend on the regulations being adopted to govern recycled-content standards and other requirements, technology improvements that will have an impact on the amount and types of wastepaper grades that can be used to produce various grades of paper and paperboard, customers' buying habits dealing with their preference for either recycled or nonrecycled grades of paper and paperboard, the results of the restructuring currently under way as producers and related industries establish their positions in the marketplace, and uncertain factors such as steamship container availability. ■

TABLE 1: **U.S. wastepaper prices for selected grades ($/short ton, f.o.b. seller's dock, New York, N.Y.).**

	No. 6 old newspapers	Old corrugated containers	Hard white shavings	Computer printout (with laser)
1991				
1Q	$0	$35.00	$248.33	$172.50
1990				
4Q	−1.33	23.33	266.67	175.83
3Q	−4.67	20.00	270.00	185.83
2Q	−1.66	16.66	273.33	211.66
1Q	−5.00	12.50	308.75	235.00
1989				
4Q	−16.00	17.50	327.50	255.00
3Q	−5.00	20.83	358.33	260.83
2Q	9.16	29.16	358.00	230.83
1Q	17.50	35.00	355.00	210.00
1988				
4Q	35.00	43.33	335.00	213.33
3Q	45.83	55.83	343.33	236.66
2Q	50.00	51.66	323.33	230.00
1Q	58.30	52.50	320.00	221.66

Prices are quarterly averages of paper and board mill purchase prices, f.o.b. seller's dock, exclusive of delivery charges, and they represent contract rather than spot or premium sales.

Source: *Pulp & Paper Week, Paper Recycler.*

Capacity Upsurge, Flattening Demand Mean Competitive Market Pulp Sector

Western Europe and Asia will remain growth areas, but supply is forecast to outpace demand through the early 1990s

By KRISTIN LOEFFLER

The market pulp sector of the pulp, paper, and paperboard industry is a volatile one, and the 1990s is promising to be one of the most rapidly changing periods in the history of the grade. Because market pulp is a world commodity, regional producers are subject to changes in the world supply and demand balance.

This balance is changing very rapidly. Such problems as oversupply and the proliferation of alternatives to market pulp will continue to plague producers over the next ten years. But while demand is flattening in some regions, Western Europe and Asia look to be potential areas for growth.

To examine the current market pulp market and discuss some of these problems, *Pulp & Paper* interviewed Ken Lowe, editorial director of the *Pulp & Paper Forecaster* Services and author of "Market Pulp in the Competitive 1990s," an in-depth report analyzing market pulp industry trends in the next decade.

P&P: *Much of the market pulp capacity expansions planned in the mid- and late-1980s have been coming online recently, while even more are expected to start up in the next few years. How is this changing the supply and demand balance?*

Lowe: Excess capacity will plague producers into the mid-1990s. From 1990 to 1995, the industry plans to add nearly 7.5 million tons of chemical paper-grade (CPG) pulp capacity, while demand is expected to increase by only 6 million tons. This will create competitive conditions—operating rates in the low 90s or lower through the mid-1990s—and downward pressure on prices.

An estimated 80% of all new capacity will be added in North America and South America. By the year 2000, the two regions will supply more than 60% of the world's market pulp. Nordic and Western European producers will be a smaller factor in world markets since much of their capacity will be integrated or consumed as captive pulp.

Southeast Asia will make strong gains, but much of this capacity will be directed to local consumption needs as printing/writing and tissue demand in this area continues to outpace demand in other areas. The Norscan producers supply nearly all of the bleached softwood kraft market pulp consumed—90% of shipments in 1989.

TABLE 1: **World demand for CPG market pulp by major consuming regions.**

	1989	2000
Total	26,290	35,856
Canada	946	1,211
U.S.	5,150	6,544
Western Europe[1]	12,070	15,908
Latin America	1,320	2,288
Africa	160	264
Asia[2]	6,015	8,719
Others[3]	625	922

1. Includes Nordic countries.
2. Includes Japan and China.
3. Includes Oceanic and Eastern Bloc countries.

TABLE 2: **World demand for CPG market pulp, average annual change (%).**

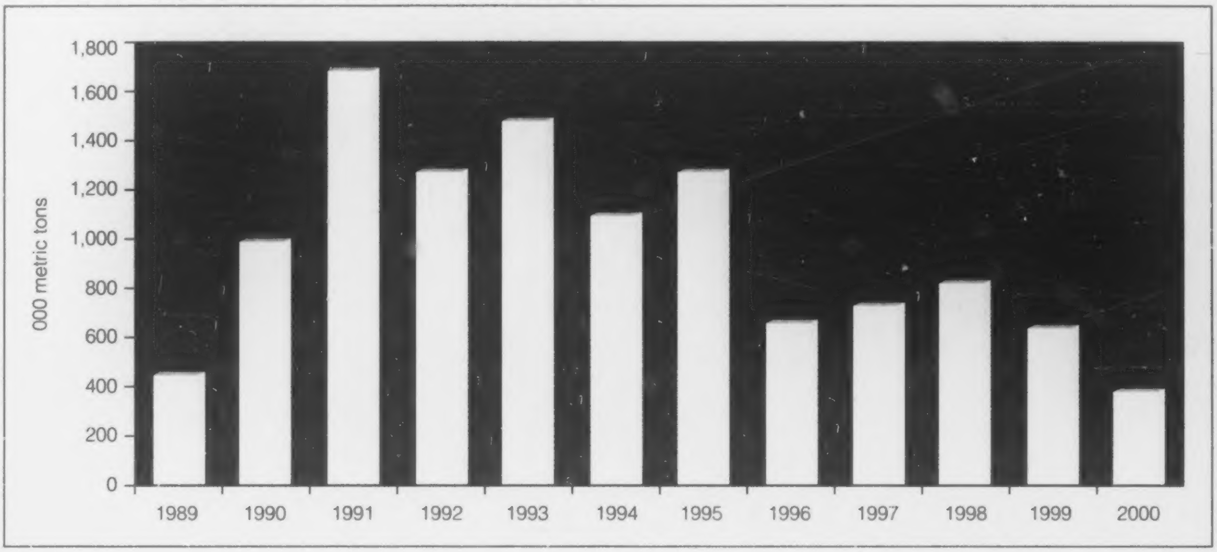
	1974-88	1981-90	1990-2000
Total	2.8%	2.7%	2.7%
Canada	3.7	3.2	2.4
U.S.	2.5	2.4	1.8
Western Europe[1]	1.7	2.4	2.3
Latin America	4.9	4.2	3.7
Africa	1.6	−1.0	4.7
Asia[2]	6.7	4.9	3.8
Oceania	1.1	−1.3	−0.2
Others	0.8	−2.2	7.3

1. Includes Nordic countries.
2. Includes Japan and China.

Ms. Loeffler is editorial assistant, Forecaster Services of Miller Freeman Inc., San Francisco, Calif.

Note: All tonnage figures are metric.

FIGURE 1: **World paper-grade market pulp capacity increases by year.**



However, shipments from non-Norscan producers have more than doubled since 1980, growing from 500,000 tons to 1.4 million tons in 1989. But from 1989 to 1995, 3.7 million tons of bleached softwood kraft market pulp will be added, 65% of which will be from Canadian and U.S. producers, and 76% of all new softwood kraft capacity will be added by Norscan producers.

P&P: *You mentioned South America as an area of significant production increases during the next decade. How much of the planned capacity will come from that region?*

Lowe: Brazil leads the expansion in bleached hardwood pulps. Fifty percent of the 4 million tons forecast to come online during the next five years will be from South American producers. Bleached eucalyptus kraft market pulp additions, mainly in Brazil, will be extensive—2 million tons between 1989 and 1995 and 3 million tons by the end of the decade if all scheduled projects are completed.

By the early 1990s, an excess of bleached hardwood market pulp capacity will exist. Therefore, some of the capacity scheduled in North America and Brazil will be integrated or sold as captive pulp.

P&P: *What steps must market pulp producers take to counter this oversupply problem?*

Lowe: In past periods of oversupply, producers have taken corrective measures, such as integrating capacity, shutting down marginally profitable operations, and postponing or canceling expansion projects. These are likely to be called on again to lessen the impact of excess capacity and limit the drop in operating rates and prices.

Unless producers undertake some preventive actions, operating rates should remain in the low 90s through the mid-1990s. There are a number of variables that could help or hinder a rebound in rates.

Year to year, demand can vary by as much as 5% from historical trend levels due to unexpected short-term variations—strikes or inventory pulldowns, for example. But if demand is affected by factors such as very strong growth in developing countries or increased pulp substitutions, permanent changes in demand would result.

Our forecast is the most likely scenario based on our model, but there is about a 15% chance that the figure will run at the statistically higher end of the model forecast. According to the more pessimistic forecast—that is, if capacity expands at forecast levels and demand follows projected trends, operating rates will decline to the mid 80s by 1994.

P&P: *Will producers in all regions be affected equally?*

Lowe: Producers in the U.S., and to some extent in Canada, are sheltered because of the declining value of the U.S. dollar, which makes prices for U.S.-produced pulps lower in local currencies. From 1986 to 1989, for example, the U.S. dollar price for northern bleached softwood kraft (NBSK) pulp leaped 76% but grew by only 52% in Japanese yen and by a mere 28% in German marks.

Prices in U.S. dollars for all grades of CPG pulp should continue the decline that began in 1990 into the early part of the decade, but the rates will vary among grades. For instance, prices in domestic markets for NBSK pulps historically average about $35/ton higher than those for southern pine pulps. In early 1991, the price differential was at a record $100/ton, and due to the higher manufacturing cost of NBSK, it will remain $75 to $100/ton higher unless the currencies of Canada and the Nordic countries are devalued against the U.S. dollar.

***P&P:** What factors are affecting demand for market pulp, and are there geographical regions where demand is expected to increase significantly?*

Lowe: Growth within any region of the world primarily depends on how fast demand for printing/writing papers in that region increases and on the ability of the region to produce pulp for internal use. Printing/writing and tissue grades consume about 84% of all CPG market pulp.

During the last five years, the highest rates of growth for printing/writing grades, and hence the strongest demand for market pulp, has been in Asia and Western Europe. Western Europe will continue to be the largest consumer, but demand in Asia and other areas outside North America will grow at increased rates. Demand for paper-grade market pulps in other paper and board grades, such as newsprint, packaging grades, and boxboard, will grow only marginally.

***P&P:** Mechanical pulping has come on strong in the past few years, and numerous producers have come online with bleached chemi-thermomechanical pulp (BCTMP) capacity. How has the growth in mechanical pulps affected the market pulp market?*

Lowe: On a tonnage basis, demand for CPG pulps will remain strong since few other fiber sources can provide quality comparable to that of CPG pulps. But the use of higher-quality mechanical pulps and the increased use of wastepaper and fillers will reduce the percentage of CPG market pulp used in printing/writing and tissue grades.

For instance, each ton of printing/writing and tissue paper produced in 1989 consumed about 0.34 ton of CPG market pulp. In the late 1970s, the ratio was 0.50 ton, and by the year 2000, it will have declined to 0.29.

The worldwide demand for paper-grade mechanical pulps, including CTMP, is now about 2.2 million tpy and is forecast to grow by about 4 million tpy by the year 2000. In 1990, 7% of world paper-grade market pulp demand (mechanical and chemical) was for mechanical, and by the year 2000, the ratio will have increased to 10%. ■

More information on market pulp

Interested readers can obtain more information on this report, including a free prospectus, by contacting Ola Jane Gow, Forecaster Services, Miller Freeman Inc., 600 Harrison St., San Francisco, Calif. 94107; Phone: (415) 905-2278; Fax: (415) 905-2240.

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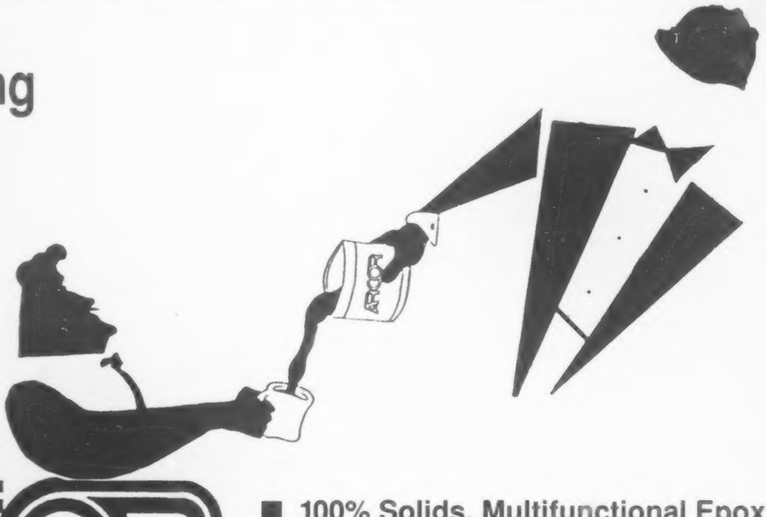

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Talc Use in Coating Formulas Gains Popularity in European Paper Mills

Combined with kaolin and carbonates, talc as a coating pigment is attracting increased attention, while markets for filler talcs remain stagnant

By WILHELM SCHOBER

For decades, talc has been used as a filler for various types of paper. Among the grades for which it has been employed are wood-free paper, wood-containing supercalendered (SC) paper, base paper for coating, and white top layer for folding boxboard and wallpaper. In all these applications, talcs compete with kaolin and carbonates.

Regions with locally available talc usually have the highest consumption levels. In Europe, these producer countries are Finland, France, and Italy, where domestic suppliers offer medium-brightness (72% to 80% ISO) talc with particle sizes down to 30 micrometers. Filling rates can be as high as 25%.

With increasing numbers of mills switching to neutral sizing and with restrictions on the use of talc in copying paper, filler talc consumption dropped in the early 1980s in Europe. Talc continues to be of vital importance in only a few fields of application, notably as a filler for SC rotogravure grades.

In North America, the market for filler talc is also weak because of availability of cheap prime-quality kaolin. But both Southeast Asia and India have become very important for the talc supply industry. More than 800,000 tpy are used as paper fillers in this Asian region, with Japan and Rep. Korea accounting for 50% of total consumption.

LOW ABRASION IS THE KEY. Talc's success in this market is partly due to its low abrasion compared with most other locally available filler minerals—mainly dry-ground carbonates and kaolin, which often contain hard impurities. Papermakers are able to capitalize on the primary advantages offered by talc:

- Good wire retention and sheet formation
- Longer wire life because of low abrasion
- Improved smoothness and printability of the paper produced
- High brightness (80% to 87% ISO).

The addition of talc to a more abrasive mineral filler can help reduce wire abrasion and also leads to higher retention.

Looking to the future, although carbonates are gaining in importance in Japan, talc fillers are also receiving added impetus. It appears that the Southeast Asian countries and Japan will use more filler talc in the future, especially grades with low abrasion.

COATING: FINNS LEAD THE WAY. Talc is typically used as a coating pigment for rotogravure printing paper grades. The first positive results for coating came from Finland in the production of lightweight coated (LWC) paper. Currently, talc is used as one constituent in a coating formula in combination with kaolin and carbonates. It typically accounts for 25% to 40% of the formula.

Using kaolin—the main coating pigment—for comparison, Finnish technicians have found that talc has the following characteristics:

- Reduced gloss, increased opacity
- Smoother surface
- Good printability (Heliotest, Winston)
- Excellent press runability
- Softness and a "shape" factor, making for better calendering
- Good coverage with low substances.

When using talc, it is also important to remember the following:

- It is more expensive and difficult to wet hydrophobic talc than kaolin.
- The specific behavior of talc requires careful management of its rheology, given the higher viscosity, and leads to a higher risk of dilatant behavior at high speeds. Since more air is bound to the mineral slurry, higher dosages of defoamer are needed. Also, different additives and binders are required to make talc compatible with carbonates and clays.
- The recycling of talc-coated wastepaper leads to higher chemical loads.

Most of these problems have been solved over the past few years, but some still persist. Despite this, demand for talc coating pigments is rising steadily.

Mr. Schober is a consultant and head of Schoconsult, Nepomukgasse 21, 8045 Graz, Austria.

TABLE 1: **Talc consumption in the pulp and paper industry.**

	Europe 1986	Europe 1990	East Asia 1989	N. America 1989
Filler	450,000	300,000	850,000	5,000
Pitch control	145,000	165,000	100,000	140,000
Coating	60,000	90,000	0	0

SUPPLY EXCEEDS DEMAND. Talc resources are extensive, but large-scale occurrences of high-quality talc are rarely found. The paper industry is an important outlet for the talc-producing industry worldwide, accounting for nearly 50% of sales (Table 1). The market has become highly competitive during the past few years, and rationalization among suppliers has led to a battle for market share rather than a drive for better prices.

People's Rep. China and Rep. Korea supply a large share of the low-cost filler talcs in the Far East. Western Mining Corp. (WMC) has a large-scale (200,000-tpy), high-quality ore body, with a good location in western Australia, serving Southeast Asia and Japan. India's major talc producer, Golcha, is also following the growing market, producing nearly 200,000 tpy. In addition, it plans to expand its product line to include micronized grades.

The North American market is mainly served by Cyprus (530,000 tons in 1989) and Pfizer. Meanwhile, European talc producers are feeling the effects of rationalization—the number of suppliers has fallen dramatically, and a few names have disappeared as independent companies. Most European producers have specialties for the pulp and paper industry. The main players are listed as follows.

Cyprus, Belgium, has always had a large share of the pitch-talc market (see sidebar). Until 1986, large quantities of crude talc were imported from WMC's mine at Three Springs, Australia, and from Cyprus Minerals Corp., U.S., the parent company. Now it appears that mainly Spanish (Dimta, 25,000 tons) and U.S. talcs are being imported and processed.

Westmin Talc, a subsidiary of WMC, recently started its own local grinding operation in the Netherlands. The facility imports, micronizes, and markets Australian talc.

Finnminerals has a large market share that increased further after it took over Partek's Myllykoski operation at the end of 1990. The whole company now produces nearly 400,000 tpy, with all grades displaying above-average brightness.

The Talcs de Luzenac group, part of RTZ-Borax, mainly supplies French and Benelux paper mills from its French plant (330,000 tons). The recent takeover of Val Chisone, Italy, increased its influence on the Italian market. The pitch talc market is supplied by Austrian subsidiary Naintsch, which predominantly processes dark local talc and white talc imported from Golcha and China.

Industria Mineraria Italiana Fabi is one of the rare family-owned talc companies. The mine's large resources and a program encouraging investment in micronized grades have resulted in increased interest by the paper industry in IMI-Fabi's pitch control products. Total output is around 65,000 tpy.

QUALITY RISES, PRICES FALL. Traditional European and North American talc suppliers have been looking for increased market share during the past four years. Prices for all types of talc have fallen steadily, while average brightness and fineness have increased.

The profitability of the industry has been adversely affected. Economic consolidation is bound to follow the period of rationalization, and price increases of at least 10% in the coming years can be expected.

Paper mills risk raising their dependence on fewer potential suppliers, with the price/ton remaining the dominant factor in the selection of raw materials, rather than others, such as cost/performance and supplier/customer relationships.

Filler talc prices (as of February) vary from $70/ton to $200/ton, depending on brightness, fineness, quantity, and competition with other industrial minerals, predominantly kaolin. As brightness and abrasion specifications become more important, talc prices will probably increase accordingly.

WHAT DOES THE FUTURE HOLD? Consumption of pitch control talc (see sidebar) is expected to grow more quickly than paper consumption itself, since faster paper machines, demands for higher quality, and environmental measures will favor its use. Papermakers will increasingly focus their attention on minerals wherever possible to reduce chemical and wastewater loads. This trend will be global.

The trend toward neutral sizing has leveled off, and demand for filler talc will recover in some important niche markets. Inexpensive, high-quality talc is avail-

TABLE 2: **Development of pitch talc prices in Europe.**

	1986 DM/ton	1990 DM/ton
W. Germany	430-650	380-500
Italy	500-600	380-500
U.K.	600-700	600-700
Benelux	400-600	400-450
Sweden	500-700	400-500

able in Asia, and demand will grow substantially.

The development of coating talc is close to a breakthrough. How quickly it is achieved will depend on the R&D efforts of the paper, mineral, and related chemical industries. ■

Pitch control use still growing

The term "talc" does not convey the diversity of this mineral in its natural state. On one hand, talc is a pure magnesium silicate found in India, China, Australia, the U.S., and other countries. On the other hand, it is a general term for a polymineralic rock.

Talc is most frequently accompanied by "charlotte," in which the magnesium ion is partly replaced by aluminum (France, Austria, Italy). Chlorite also has a lamellar structure with properties very similar to pure talc. There are many theories about the quality of talcs and chlorites, but in practice the grinding system is of similar importance to the mineralogy.

An important and traditional use for talc is in pitch control in pulp and paper mills (softwood and hardwood). One of talc's valuable surface properties is its ability to absorb organic impurities. Using talc reduces machine downtime and improves product performance.

Platy talc is added to process water when the pitch is still in a dispersed form immediately after it has been freed from the woodfibers. Talc acts as a carrier, and most of the pitch and talc are sold with pulp and paper. The dosage rate is around 1% in pulp mills and 0.3% to 0.6% in paper mills.

As far as economic and environmental aspects are concerned, talc has good cost performance and allows partial substitution of chemicals. Combining its use with chemicals produces some synergistic effects. In many cases, it is most efficient to use pretreated talcs (cationic or anionic). Finding the right interaction between chemical additives and the mineral could prove important in the future.

Talc's efficiency depends on particle-size distribution, with the specific surface (a typical measurement is 10 to 17 m^2/g) and the quality of dispersion the most important parameters. Only perfectly dispersed material with the mineral's entire surface available for pitch absorption provides economic results. Since talc is hydrophobic, special techniques are needed. Adding dispersant interferes with the natural behavior, while highly concentrated slurries can be obtained only with special stirring systems. Few machine manufacturers in the world can offer good technical solutions for dispersing talc.

As an aerophilic material, talc can also be used in deinking processes, including flotation. In Europe, it is mostly used in the deinking of tissue and newsprint. Talc dosage is about 1% to 1.2%, and a high specific surface is required. Talc brightness is not as important as it is for other applications. This area requires more investigation by paper mills as well as chemical and industrial mineral producers.

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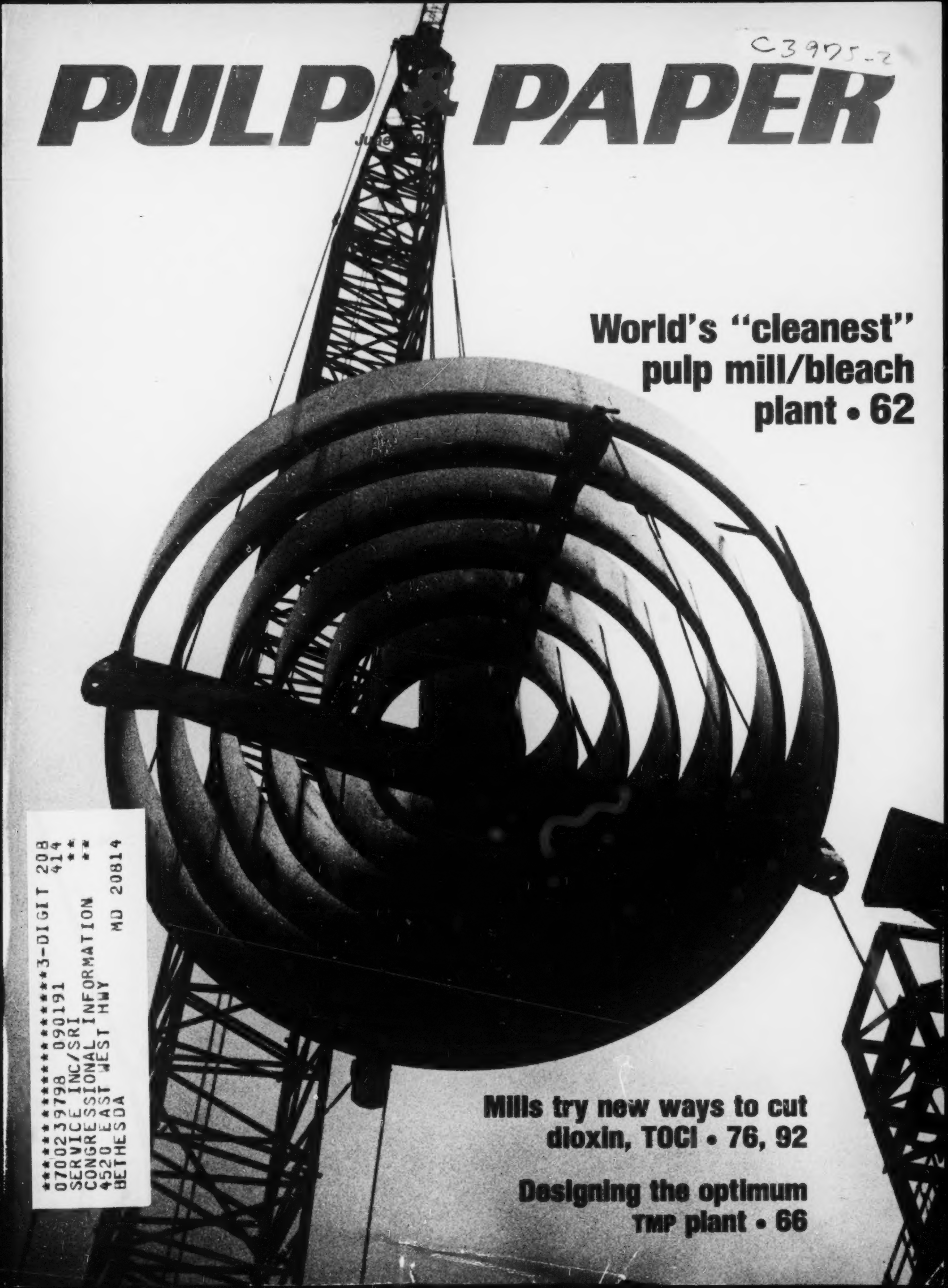

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A single-stage, titanium, atmospheric diffusion washer is being lifted for installation in one of Alabama Pine Pulp Co.'s four bleach plant towers at Perdue Hill, Ala. As detailed in a feature report beginning on p. 62, APP will start up one of the world's most advanced pulp mill/bleach plant operations later this year. **(Photo courtesy of Kamyr Inc.)**

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ABP

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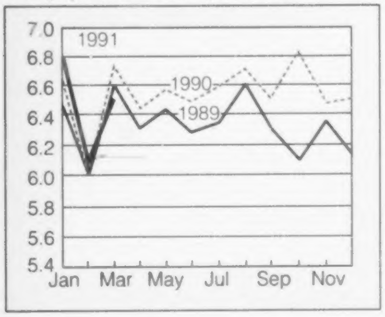
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.5 million tons in March, down 2.1% from the same month last year, according to the American Paper Institute. Production trended downward throughout the first quarter, finishing with a seasonally adjusted annualized rate of 77.5 million tpy, down 0.4% from the same time last year. Weakness continued to center on the paper grades, which were down 3.4% for the month and 2.7% for the quarter. Paperboard production has fared better, posting a 1.9% gain for the first quarter, although here too the trend is downward.

Among major grades, shipments of printing and writing paper were down 5.8% through March due to the strong impact of the recession on all major consumers, particularly magazine publishers, business forms converters, and envelope converters. Containerboard production for the domestic market was up 1.7% for the first quarter, but inventory building in January masked an overall decline in demand, API reports. Shipments of fiber boxes fell 8.9% in March from a year earlier, bringing the first-quarter total down 3.8%.

Canadian newsprint, woodpulp, and other paper statistics for March were not available at press time. U.S. imports of Canadian newsprint were down 7.3% in March, according to Commerce Dept. figures, bringing the rate for the first quarter down 3.7%. Woodpulp exports to the U.S. declined 3.5%. ■

		Latest month (000 short tons)	**% change from year ago**	**Annualized year-to-date (000 short tons)**	**% change from year ago**
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Mar.	574	5.7	6,686	4.1
Uncoated groundwood (s)	Mar.	147	-2.0	1,696	-4.7
Coated paper (s)	Mar.	588	-4.2	7,155	-3.7
Uncoated free-sheet (s)	Mar.	896	-8.9	10,898	-6.8
Other printing/writing	Mar.	137	-6.8	1,548	-6.0
Total packaging and other paper (s)	Mar.	390	-0.5	4,553	-0.6
Tissue	Mar.	485	-3.0	5,718	0.3
Total paper	**Mar.**	**3,217**	**-3.4**	**38,254**	**-2.7**
Unbleached kraft paperboard	Mar.	1,701	-0.8	20,593	3.8
Semichemical medium	Mar.	469	-3.3	5,681	1.1
Bleached paperboard	Mar.	387	-0.3	4,550	0.5
Recycled paperboard	Mar.	767	0.5	8,894	-1.1
Total paperboard	**Mar.**	**3,324**	**-0.8**	**39,718**	**1.9**
Total U.S. paper and paperboard output	**Mar.**	**6,540**	**-2.1**	**77,971**	**-0.4**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Feb.	5,033	0.9	63,672	2.1
Market pulp production	Feb.	756	12.0	9,115	4.0
Wastepaper consumption at paper/board mills	Feb.	1,669	3.2	20,912	4.7
Pulpwood consumption (cords)	Feb.	8,115	0.1	101,496	1.5
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft^2)	Mar.	24.495	-8.9	76.072[6]	-3.8
Containerboard inventories at U.S. box plants and mills	Mar. 1	3,071	20.0		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Feb.	1,008	-2.4	12,681	-1.5
Imports of Canadian newsprint	Feb.	638	-7.3	7,989[6]	-3.7
U.S. paper exports (including products)	Feb.	643	28.9	7,739	19.4
Exports of unbleached kraft linerboard	Feb.	243	30.6	2,960	21.6
Exports of woodpulp	Feb.	485	18.3	5,765	15.7
Norscan pulp inventories[4]	Mar. 31	1,604	15.2		
Norscan pulp operating rates[4]	Mar.	88%	98%	88%	91%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Mar.	n.a.	—	n.a.[6]	—
Operating rates	Mar.	n.a.	n.a.	n.a.	n.a.
Inventories held by U.S. consumers	Mar. 31	n.a.	—		
Other paper/board shipments	Mar.	—	—	—	—
Woodpulp shipments (export only)	Mar.	n.a.	—	n.a.	—
Operating rates	Mar.	n.a.	n.a.	n.a.	n.a.

---

[1] American Paper Institute. [2] API, Bureau of Census, American Pulpwood Assn. [3] Fibre Box Assn., Paperboard Packaging Council. [4] North American/Scandinavian paper-grade market pulp. [5] Canadian Pulp & Paper Assn. [6] Not annualized. (s) = Shipments.

Recycled paperboard: Producers add capacity to meet rising demand for recycled packaging

Grade structure: Recycled boxboard is made primarily from secondary fiber or wastepaper and is produced on either a fourdrinier, multi-ply, or cylinder paper machine. Grades include folding boxboard, corrugating medium, linerboard, gypsum wallboard, and core/can/tube stock.

Markets: Markets for recycled paperboard grades, as measured by their 1991 capacity share, are folding boxboard, 25.7%; setup boxboard, 3.0%; corrugating medium, 22.3%; gypsum wallboard, 13.2%; linerboard, 7.3%; container chipboard and filler board, 0.3%; and core/can/tube stock and other converting grades, 28.2%.

Production/capacity: Production declined 0.3% to 8.731 million short tons in 1990. Production in early 1991 remained at the same level as a year ago with good demand for containerboard and folding carton grades but lower demand for most other construction and industrial packaging grades.

The projected increase in capacity for recycled paperboard from 1991 to 1993 is 1.389 million tons, according to the American Paper Institute. This represents 4.4% annual growth over the next three years. Containerboard grades will account for 78%, or 1.086 million tons, of the additional capacity. Recycled linerboard capacity alone is expected to increase at a 39% annual rate to reach 1.453 million tons in 1993. From a significantly larger base of 2.229 million tons in 1990, recycled corrugating medium capacity will increase to 2.402 million tons in 1993.

These major recycled containerboard expansions will outpace current demand growth this year and perhaps again next year. Therefore, total industry operating rates are expected to drop to about 85% of capacity. However, mills that are producing folding boxboard and other consumer packaging grades should enjoy much higher operating rates.

Outlook: For 1991, production of recycled paperboard is forecast to increase by 1.5%. Mills will be helped by strong, steady demand for recycled folding boxboard and the displacement of kraft linerboard and semichemical corrugating medium by the recycled grades. Manufacturers of corrugated boxes plan on using more recycled linerboard and medium grades to increase the amount of recycled fiber in their packaging.

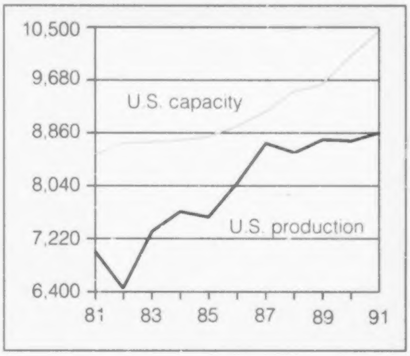
In early 1991, Green Bay Packaging Inc. converted its former semichemical medium mill in Green Bay, Wis., to recycled linerboard, using 100% wastepaper, and Stone Container Corp. is currently converting its Seminole kraft linerboard mill in Jacksonville, Fla., to recycled linerboard. By year-end 1992, total capacity for recycled linerboard will be close to 800,000 tons compared with approximately 463,000 tons at the end of 1989.

Demand for other grades of recycled paperboard is forecast to remain depressed until the long decline in home construction is reversed and sales of gypsum wallboard and other construction grades pick up again. The same is true for industrial core/can/tube packaging grades.

Prices: Mills successfully raised market prices for recycled folding boxboard grades twice in 1990. The current benchmark price for 20-pt, clay-coated newsback (CCNB), which is widely used in folding cartons, is $540 to $550/ton, and kraft back grades sell for about $560 to $580/ton. Prices of uncoated grades increased $25/ton to $365 to $385/ton. West Coast mill prices are typically $20 to $30/ton higher than eastern U.S. prices, and prices for special back grades are also typically higher than standard CCNB grades.

Historical prices: Clay-coated, 20-pt folding carton boxboard (rolls, $/short ton, year-end) prices are as follows: 1980, $380; 1981, $400/425; 1982, $380/425; 1983, $370/425; 1984, $375/425; 1985, $350/400; 1986, $380/420; 1987, $390/415; 1988, $465/$510; 1989, $465/$510; 1990, $540/$580. Bending 20-pt chipboard (rolls, $/short ton, year-end) prices are as follows: 1980, $260/275; 1981, $270/280; 1982, $280; 1983, $280/300; 1984, $300; 1985, $300; 1986, $320; 1987, $320; 1988, $340/$360; 1989, $340/$360; 1990, $365/$385. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1989	1990	1991
Production[1]	8,754	8,731	8,862e
Capacity[1]	9,617	10,026	10,455
Utilization rate	91.0%	87.1%	84.8%
Imports	95	100	85
Exports	38	52	64
Apparent U.S. consumption	8,811	8,779	8,883
lb/capita	71.85	70.34	71.00
GNP ratio[2]	2.14	2.11	2.11

[1] American Paper Institute production, capacity data.
[2] 1,000 tons/$ billion real GNP.
e = *Pulp & Paper* estimates.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity (000 tons)	Market share (%)
1. Jefferson Smurfit	1,330	12.7
2. Newark Group	875	8.4
3. Sonoco Products	850	8.1
4. Rock-Tenn[1]	607	5.8
5. Carauster Industries	565	5.4
6. Inland Container	550	5.3
7. Waldorf	395	3.8
8. U.S. Gypsum	390	3.7
9. Packaging Corp.[2]	280	2.7
10. National Gypsum	240	2.3
11. Federal Paper Board	200	1.9
12. James River	180	1.7

Market share of top five companies:
40.4%
Market share of top ten companies:
57.5%
Total U.S. capacity (1991):
10.455 million short tons

[1] Acquired former Specialty Paperboard Inc. mill in Sheldon Springs, Vt., in early 1991.
[2] Acquired Jackson Paper Mfg. Co. in late 1990.

SALES AND EARNINGS

U.S. paper industry earnings down 54%

Through the first quarter of 1991, declining prices, sluggish demand, and excess capacity continued to squash markets for U.S. paper companies. Georgia-Pacific Corp. and Boise Cascade Corp. reported losses, and the results for a number of other major companies hovered at break-even levels. A *Pulp & Paper Week* survey of 31 U.S. paper and forest products companies showed a net earnings decline of 53.9% to $584.4 million in the first quarter of 1991 compared with the same period in 1990. Sales revenue among the companies surveyed slipped 4.1% to $22.6 billion.

Price erosion in pulp, linerboard, and printing/writing paper and the apparent failure of the Jan. 1 newsprint price hike late in the quarter hurt the performance of many companies, some of which also struggled with abysmal wood products markets despite the recent improvement seen in housing starts and lumber prices. Some companies were also hurt by higher interest and depreciation from recent expansion projects. Companies that managed profit growth in the period included Kimberly-Clark Corp., Pentair Inc., P.H. Glatfelter Co., and Wausau Paper Mills Co. Some analysts projected that paper industry earnings would trough in the second quarter, while wood products businesses may have hit the bottom in the first quarter and should begin to turn around.

Some losers. Despite pretax gains on the sale of some U.S. containerboard assets and a French packaging unit in the first quarter, Georgia-Pacific reported a surprising $7-million loss, compared with a profit of $101 million in 1990. Excluding the asset sales, the company had a net loss of $50 million. Its operating profit from pulp and paper declined to $146 million from $182 million, the company said, while building products plunged to $7 million from $115 million.

"The company's performance obviously has been affected by the economic downturn," said G-P CEO T. Marshall Hahn Jr. All of the net proceeds from assets sales were applied to debt, G-P said, which was reduced by about $855 million in the first quarter.

An $8-million loss was reported by Louisiana-Pacific Corp., which had earnings of $35.8 million in the first quarter of 1990, with "conditions in the building products market among the worst we've ever seen," the company commented. Falling pulp prices also hurt earnings.

As it had indicated earlier, Boise Cascade reported a $16.8-million loss for the first quarter, compared with a profit of $33.6 million in first-quarter 1990. The company said it suffered from price erosion for most of the

U.S. paper/products industry results.

	First-quarter 1991 ($000)			
Companies	**Sales 1991**	**% change 1991/90**	**Earnings 1991**	**% change 1991/90**
Badger Paper Co. Inc.[1]	$18,778	+1.1%	$1,413	139.8%
Boise Cascade Corp.	992,730	−6.9	(16,850)	NM
Bowater Inc.	324,488	−4.1	16,737	−24.6
Champion International Corp.	1,164,812	−9.3	14,786	−78.8
Chesapeake Corp.	198,439	−2.5	2,449	−44.7
Consolidated Papers Inc.	229,630	−4.5	25,639	−36.4
Federal Paper Board Co. Inc.[1]	331,822	4.7	27,899	−28.1
Fort Howard Corp.	272,954	2.3	(26,772)	NM
Gaylord Container Corp. (2nd Q)	173,200	7.2	(12,700)	NM
Georgia-Pacific Corp.[1]	2,778,000	4.5	(7,000)	NM
P.H. Glatelter Co.	149,106	−5.9	20,525	2.8
International Paper Co.	3,100,000	−3.1	132,000	−26.7
James River Corp.[1]	1,169,510	−18.8	39,398	−21.1
Kimberly-Clark Corp.	1,667,600	6.0	120,300	2.6
Longview Fibre Co. (1/31)[1]	152,355	−8.7	1,458	−88.7
Louisiana-Pacific Corp.	362,400	−23.7	(8,600)	NM
Mead Corp.	1,097,200	−3.8	13,400	−66.1
Mosinee Paper Corp.[1]	49,485	−12.2	417	−85.5
Pentair Inc.	289,100	0.9	7,375	30.5
Pope & Talbot Inc.[1]	132,066	−11.4	2,149	−80.5
Potlatch Corp.	293,577	−10.1	9,627	−74.0
Scott Paper Co.	1,234,200	−4.0	29,300	−51.2
Sonoco Products Co.	407,661	1.0	22,860	−7.9
St. Joe Paper	134,839	−16.3	2,893	−76.7
Stone Container Corp.	1,336,800	−8.0	1,300	−96.5
Temple-Inland Inc.	606,900	−2.7	42,100	−32.3
Union Camp Corp.	722,129	2.9	41,239	−38.8
Wausau Paper Mills Co. (2/28)[1]	81,309	1.5	6,700	54.3
Westvaco Corp. (1/31)[1]	573,343	−2.1	16,574	−64.3
Weyerhaeuser Co.	2,062,665	−9.6	52,403	−59.7
Willamette Industries Inc.	461,184	−1.9	5,451	−87.2
Total	**$22,588,282**	**−4.1**	**$584,470**	**−53.9%**

1. Income after taxes, from continuing operations. ( ) = losses. NM = not meaningful. **Badger Paper Mills.** 1990 income was adjusted upwards by $1.4 million for the cumulative effects of a change in accounting for income taxes. **Federal Paper Board.** 1991 income includes after-tax gain of about $3.2 million on the sale of its mechanical packaging operations. **Georgia-Pacific.** 1991 results include $43-million after-tax gain on sale of containerboard and packaging assets. **James River.** 1991 results do not include operations slated for divestiture as part of a restructuring plan announced in August 1990. The two quarters are not directly comparable, the company said. **Longview Fibre.** 1991 income includes pretax gain of $2.3 million on sale of assets. **Mosinee Paper.** 1991 includes charge of $1.9 million for incentive and deferred compensation plans. **Pope & Talbot.** 1990 results include net restructuring gain of $3.1 million. **Wausau Paper Mills.** 1990 results include life insurance proceeds of $1.9 million, related to the death of CEO William L. Goggins in December 1989. **Westvaco.** 1991 income includes $25-million pretax charge related to cost reduction programs.

grades it produces and also was impacted by poor office products markets, higher Pacific Northwest wood costs, and increased depreciation expense for its expansion program. Unless market conditions quickly improve, Boise said it expects financial results to dip further in the second quarter, especially because of the full-quarter effects of recent price decreases.

Higher volume and reduced energy costs were positive developments in the quarter ending Mar. 31 for Gaylord Container Corp., but they were not enough to offset the effect of lower prices and higher interest expense as the company reported a $12.7-million profit loss in its second fiscal quarter compared with a loss of $12.5 million in the same quarter of 1990. The company said that it was additionally hampered by the temporary idling of board machines at its mill in Antioch, Calif.

In that light, a 26.6% decline in earnings to $132 million reported by International Paper Co. in first-quarter 1991 compared with the same period in 1990 appeared to be a strong performance, given the difficult operating conditions. The company said that geographic and product diversity and expanded manufacturing of value-added items continued to serve it well despite erosion in its wood products and printing/writing paper businesses. International Paper's sales slipped 3.1% in the first quarter to $3.1 billion, the company said last month.

Containerboard difficulties. Major containerboard producers were hurt by sharply lower prices in the first quarter. However, Union Camp Corp. CEO Gene Cartledge said that "domestic box shipments held up well during the period, and we continued to experience strong export demand for linerboard, with first-quarter shipments up 15%." The company reported a 39% drop in profits for the first quarter from a year earlier. Profits were also hurt by an industry-wide decline in white paper prices due to new capacity entering the market, he said.

Similar factors caused a surprising 87% decline in profits for Willamette Industries Inc., which the company said were "market related" and did not reflect operating problems.

Stone Container Corp. reported it had close to break-even profits for the first quarter, but chairman and CEO Roger W. Stone expressed optimism that his company's markets were at the bottom of the cycle. "The economic need for price increases or restorations is great, and with anticipated high operating rates, strong export sales, and reasonable growth in capacity, we believe that within 12 months or so containerboard mills should be sold out."

The company said that it looks toward 1992 for relief from poor newsprint markets. Interest costs from the $2.7 billion in debt related to Stone's 1989 acquisition of Consolidated-Bathhurst Inc. continue to hurt results.

Significant improvements at its new kraft market pulp mill in Tennessee and its Nova Scotia newsprint mill were the highlights of a tough quarter for Bowater Inc. Although newsprint margins showed some improvement, the company said, U.S. consumption was down sharply in the first two months of 1991. The company added that dollar exchange rates will be a key to lifting newsprint and market pulp exports in the coming year.

Coated paper free-fall. Depressed pricing on coated paper markets and weak volume in all communications papers grades hurt James River Corp., which also suffered from increased competition in its retail tissue business. The company is pulling out of the specialty paper and coated freesheet printing paper markets and reported that its sale of the Specialty Papers Business to AEA Investors Inc. is progressing on course and should close soon. Consolidated Papers Inc. reported weaker demand for coated printing paper brought on by a decline in magazine ad pages and a postal rate increase that took effect in February.

Some winners. Lower pulp prices cut into profit margins for many producers, but they proved beneficial to Wausau Paper Mills, which had record quarterly earnings and net sales in its second quarter ending Feb. 28. Wausau cited the smooth operation of its mills and its aggressive capital spending programs for the strong performance. The company will continue to focus on its specialized market niches, according to CEO Arnold M. Nemirow. "This strategy has generated healthy financial results and should allow us to perform well even during the current economic downturn," he said.

Also showing profit growth in the quarter was Pentair, which enjoyed strong demand for its recycled Cross Pointe paper. A "growing acceptance" of supercalendered publication paper helped offset the pricing weakness in coated paper markets, Pentair commented. Continued decline of market pulp prices will further assist business, Pentair said, especially with increased demand expected from election activities and Olympic events in 1992.

The first-quarter operating earnings for Weyerhaeuser Co.'s forest products sector dropped 67% to $40 million, but the company found solace in a mere 1% earnings decline in its pulp, paper, and paperboard business, which reported improvement in fine paper, newsprint, and bleached paperboard.

Tissue more competitive. Higher results from worldwide tissue operations offset weak demand for publication paper, resulting in a 51% profit decline for Scott Paper Co. in the first quarter. "Strong competitive activity" across its U.S. tissue business was more than offset by the healthy performance of its international operations, the company said. European earnings increased 70%, Scott said, primarily due to improvements in the U.K. and with the Scott-Feldmühle joint ventures formed in fourth-quarter 1990.

However, weak demand and repairs to a recovery boiler at the Skowhegan, Maine, mill caused the S.D. Warren Div. to report an 86% drop in income from operations for the first quarter. Because of the weak demand, the company said it could not "fully utilize its recently completed capacity additions" at the S.D. Warren Div. and was continuing selective machine curtailments begun late last year.

Kimberly-Clark reported the best sales growth of the quarter on the strength of its personal hygiene products and overseas consumer products businesses, and it was the second most profitable paper company, following IP. K-C's recent attempt to enter the southern premium bathroom tissue market has led to modest discounting, according to an industry analyst.

Fort Howard Corp. again posted a deficit related to interest expense and financing costs of its 1988 leveraged buyout. ■

Canadian industry posts massive losses

Despite some benefit from belt tightening measures, first-quarter 1991 sales for the Canadian pulp and paper industry tumbled and only two companies reported making any profit growth at all. A *Pulp & Paper Week* survey of 19 Canadian forest products companies showed a net loss of C$183.6 million compared with a gain of C$126.6 million in the first quarter of 1990. Sales dropped 13.2% for the companies surveyed to C$5.3 billion, a sign that the recession in North America may last longer than thought even two months ago.

The Canadian pulp and paper industry appears to be experiencing its worst recession since the 1930s, with rampant mill closures, machine shutdowns, worker layoffs, and asset sales from the Maritimes to British Columbia. Only two Canadian companies in the survey, Rolland Inc. and Scott Paper Ltd., reported profit growth in the first quarter.

"It's quite a bit worse than 1982-83," said an analyst in Montreal, Que. "The East was at least making some money then." And the second quarter of this year is expected to be even worse.

Part of the poor picture is that current performance is being compared with the opulence of 1988 and 1989, when earnings records were broken, noted Wood Gundy Inc. analyst Rob Duncan. Now the cyclical misfortune of newsprint and market pulp businesses, which make up about 75% of the Canadian paper industry's output, has combined with a higher Canadian dollar compared with U.S. currency. Required environmental and recycling-related upgrades are making dramatic demands on limited cash flow as Canadian companies struggle to cut costs and remain competitive with their U.S. and Scandinavian rivals.

Doldroms in the East. Recent improvements in housing markets in Canada and the U.S. are not expected to be enough to lift Noranda Forest Inc. from red ink this year. The company suffered a C$38-million loss in the first quarter, compared with a C$6-million gain a year ago. Capital spending was trimmed 50% to C$70 million in the first quarter and is expected to be reduced to less than C$383 million this year from C$569 million in 1990. Cascades Inc. anticipates cutting capital spending to C$75 million in 1991 compared with C$93.4 million last year.

Many industry executives point fingers at government policies that prop up interest rates, tax lumber to the U.S., and jack up stumpage fees in the West. Noranda Forest chairman Adam Zimmerman called for the government to devalue the Canadian dollar and put a freeze on both federal spending and wage increases to pull the country out of the recession. "With our industry base disappearing," Zimmerman said, "surely times call for an emergency response."

Abitibi-Price Inc. said its first-quarter cash flow improved but the company again lost money, posting a C$5.5-million decline compared with a loss of C$11.3 million in the same quarter of 1990. Office products and converted products continue to be profitable, Abitibi-Price said, with improved operating efficiencies and asset sales also helping to reduce last year's loss. "Our restructuring efforts to reduce costs have produced annual savings of almost $30 million," said Abitibi-Price chairman Bernd K. Koken. But the company warned that oversupply will continue in its paper markets and significant newsprint downtime will be taken.

"On the whole, the short-term industry outlook is not promising," said Paul E. Gagn, president and chief operating officer of Canadian Pacific Forest Products Ltd. "Although I believe there is room for guarded optimism, I know there is also a lot of hard work ahead for us." CPFP reported a loss of C$50.1 million in the first quarter, compared with a profit of C$4.8 million in 1990. Newsprint markets should continue to feel the effects of the weak economy and overcapacity, while overseas markets are expected to remain strong. The company anticipates limited market growth in paperboard and packaging and in white paper markets, and even its tissue business is expected to be impacted by new capacity and increased competition. CP Forest announced recently it will invest C$210 million in a thermomechanical pulp mill and paper machine improvements at its Gatineau, Que., newsprint facility. A C$350-million modernization program at its Thunder Bay, Ont., newsprint mill is nearing completion, the company said, and startup of both facilities is scheduled for this year.

Domtar Inc. CEO Pierre Desjardins

Canadian paper/products industry results.

	First-quarter 1991 (C$000)			
Companies	**Sales 1991**	**% change 1991/90**	**Earnings 1991**[1]	**change 1991/90**
Abitibi-Price Inc.[1]	$726,400	−7.4%	(5,500)	NM
Canadian Pacific Forest Products Ltd.[1]	526,100	−15.6	(50,100)	NM
Canfor Corp.[1]	213,600	−10.9	(10,700)	NM
Cascades Inc.	217,816	10.9	$821	−77.7%
Crestbrook Forest Industries Ltd.	37,701	−38.9	(2,483)	NM
Doman Industries	122,976	−22.6	(10,105)	NM
Domtar Inc.	450,000	−26.4	(28,000)	NM
Donohue Inc.	131,200	−17.1	(1,300)	NM
Fletcher Challenge Canada Ltd.	267,000	−5.3	(10,700)	NM
MacMillan Bloedel Ltd.	677,600	−13.3	3,800	−87.3
Noranda Forest Inc.	1,030,000	−14.0	(38,000)	NM
Perkins Papers Ltd.	18,511	0.0	531	−27.8
Repap Enterprises Corp. Inc.	274,200	−6.5	(17,500)	NM
Rolland Inc.	84,727	−22.1	313	79.9
Scott Paper Ltd.	118,120	−9.2	4,696	7.5
Slocan Forest Products	39,900	−27.3	(4,100)	NM
Tembec Inc. (2nd Q)	59,421	6.7	417	−91 2
Weldwood of Canada Ltd.	159,000	−0.6	(7,500)	NM
West Fraser Timber Co.	101,400	−27.9	(8,200)	NM
Total	**$5,255,672**	**−13.2%**	**(183,610)**	**NM**

1. Income after taxes, from continuing operations. ( ) = losses. NM = not meaningful. **Abitibi-Price.** Some 1990 figures have been restated. 1990 income earnings include pretax charge of $13.7 million. **Canadian Pacific Forest Products.** 1990 sales restated. **Canfor Corp.** 1991 earnings include gain of $5.8 million from insurance proceeds following a fire at its Fort St. James, B.C., sawmill.

estimated that the company's loss for 1991 could be C$100 million. The company lost C$333 million in 1990, including C$237 million in restructuring charges. Domtar lost C$28 million in the first quarter, compared with a C$10-million loss in first-quarter 1990. The company is not currently in any negotiations to sell any of its units, Desjardins said. "This would be the worst time to sell any businesses," he added. As of June, Domtar will have laid off 1,300 salaried positions, reducing its white collar work force to 3,200 while eliminating its union work force by 500 to a total of 9,500 employees by later this year.

The East's only success story this quarter, Rolland, attributed a robust 80% increase in quarterly earnings to increases in manufacturing efficiency even though revenue fell dramatically because decor paper sales are no longer consolidated.

Woes in the West. Although Canfor Corp. reported a loss of C$10.7 million in the first quarter compared with a gain of C$13.1 million in 1990 and appeared likely to end in the red for the year, the company said it appears to have survived the worst. "I think we may have turned the corner," Canfor chairman Peter Bentley told the *Globe and Mail*. Canfor's business is heavily oriented to the do-it-yourself construction market and has seen a turnaround in March and April. "I think that's a good reflection of economic activity in general," Bentley said. But business will remain difficult, he warned, with lumber prices still "not great" and no relief from British Columbia's high stumpage fees.

Fletcher Challenge Canada Ltd. said it will continue to study previously announced plans to sell or set up joint ventures for its sawmills, sell its 45% stake in Donohue St-Felicien Inc., and find an equity partner for its Crofton, B.C., pulp and paper complex in the wake of a C$10.7-million loss in the first quarter, compared with a C$15.7-million gain in 1990.

MacMillan Bloedel Ltd. topped western Canadian sales, although its revenue dipped 13% to C$677.6 million. It managed a C$3.8-million profit in the quarter, 87.3% below the same quarter in 1990. CEO Robert Findlay said hopes that consumer spending would pick up when the Persian Gulf war ended proved false, and newsprint and market pulp sales will suffer for the next year or so. ■

UNCOATED FREE-SHEET

G-P ramps up Ashdown machine in sickly market

Last month, Georgia-Pacific Corp. started up its new 325,000-tpy uncoated free-sheet paper machine at Ashdown, Ark., at a time when the market is still suffering weakened demand and plunging prices. No. 64 machine was scheduled to "be making product" the day after startup began May 2.

No. 64 is a 4,000-fpm, 388-in. Beloit machine, with a Concept III headbox, Bel-Form top wire, Tri-Nip press, and blade-metering size press. The unit also sports an AccuRay 1180 Micro-Plus control system.

The weak market is characterized by exceptionally low prices for commodity (or near-commodity) grades that will be produced at Ashdown. A number of uncoated free-sheet paper producers already had taken market-related downtime. Boise Cascade Corp. took downtime system-wide, while James River Corp., G-P, International Paper Co., and P.H. Glatfelter Co. also shut down machines, though some mills are attributing the downtime to maintenance. Usually this maintenance is scheduled for a little later in the year.

Of course, G-P's isn't the only new machine to start up within the last year or the last for the next six months. Union Camp Corp. will ramp up its 240,000-tpy unit at Eastover, S.C., sometime in mid-year, probably in June. Also aimed at the U.S. markets is tonnage from a 100,000-metric-tpy machine due online in Anahuac, Mexico, at the integrated pulp mill owned by Celulosa de Chihuahua, part of the Ponderosa group. Brazilian papermaker Celpav will ramp up its 150,000-metric-tpy machine at about the same time as Bahia Sul starts up its 230,000-metric-tpy unit. ■

K-C sets rebuild of Whiting machine

Kimberly-Clark Corp. plans to rebuild substantially its No. 4 uncoated free-sheet machine at Whiting, Wis., to triple the machine's capacity. The rebuild will create a virtually new machine and is scheduled for startup in May 1992. Cost and capacity figures were not released. This is the third major expansion within five years at the mill.

Whiting produces a variety of uncoated paper grades on four paper machines. Among the Whiting mill's products are Neenah Paper's recycled grades, which contain a minimum of 15% postconsumer waste. The grades are Classic Laid in 24-lb writing, 75-lb text, and 80-lb cover; and Environmental 25 writing, text and cover, which is touted as 100% recycled fiber with 15% postconsumer. This recycled line is the fastest growing in the history of Neenah Paper. A spokesperson was not able to say if the rebuilt No. 4 machine will produce recycled paper. The estimated capacity at Whiting is 120 tpd. ■

MARKET PULP

Alberta-Pacific pulp mill construction nears

Construction was expected to begin by last month on Alberta-Pacific Forest Industries Inc.'s bleached kraft pulp mill near Athabasca, Alta., said public relations counsel Brian Hetherington. Parent company Crestbrook Forest Industries Ltd. has lined up two partners to share the C$1.28-billion project: MC Forest Investment Inc. and Kanzaki Paper Canada Inc., a unit of Kanzaki Paper Manufacturing Co. of Japan. Crestbrook will retain a 40% interest, MCFI 35%, and Kanzaki 25%. MCFI is a subsidiary of Mitsubishi Corp., which will buy the new mill's pulp, according to the *Globe and Mail*, and Crestbrook is owned by private investors and Mitsubishi and Honshu Paper Co. The partners will be involved in financing the project. Funding will also come from a consortium of Canadian and international banks, and the provincial government will put up C$350 million in debenture loans. The 1,500-metric-tpd mill is due online in mid-1993. ■

Mechanical Pulping Projects Getting Less Attention in the 1990s

The market pulp boom is winding down, while demand for recycled fiber cuts expansion at integrated mills

By CARL ESPE, News Editor

The number of mechanical pulping expansion and modernization projects has declined over the past two years as a big new wave of market pulp capacity has come online in Canada and as integrated paper mills all over North America have scrambled to add deinking capacity to meet new demand for recycled newsprint and other papers. Together, these two trends have sharply cut back expansion in the mechanical pulp mill.

U.S. mills plan to add just 62,000 tons of net new mechanical pulp capacity over the 1991-93 period, according to the latest American Paper Institute (API) survey of capacity, an average of 0.3% a year. Over the 1980-90 period, in contrast, growth averaged 3.1% a year. New installations will add 162,000 tpy during the 1991-93 period, offset by the loss of 99,000 tons of existing capacity.

Integrated mills have cut back sharply on expansion plans for mechanical pulping in favor of projects to add wastepaper processing facilities. In 1989, mills told API that they would raise mechanical pulp capacity to almost 7.37 million tpy by 1992. In the 1990 survey, those plans were revised downward drastically, and now capacity is expected to reach 6.93 million tpy by 1993, about 437,000 tpy less than previously expected.

In Canada, the 1980s were explosive years for mechanical pulp, and the expansion boom will carry forward into the early 1990s for market pulp. Capacity growth averaged 15.2% a year during the 1979-89 period for market mechanical pulp, according to the Canadian Pulp & Paper Assn., raising overall capacity from a low of 240,000 metric tons in 1980 to 1.1 million tons in 1989. Growth will continue at a strong 13.7% rate through 1992. At integrated mills, capacity for stone groundwood pulp fell an average of 3.5% annually, but the decline was more than offset by new capacity for thermomechanical pulp (TMP), which climbed almost 23.2% a year. As in the U.S., however, deinking will cut into mechanical pulp expansion in the early 1990s, lowering the growth rate for TMP to 13.1% over the 1989-92 period.

Six new market bleached chemi-thermomechanical pulp (BCTMP) lines came online from 1988 to 1990 in Canada, and two more are scheduled for completion in 1991 and 1992. Producers have had a hard time finding new markets for their product, however, a task complicated by the boom in new capacity and the decline in prices for competing bleached kraft pulp grades. Nevertheless, industry observers say aspen BCTMP sales are going strong even though softwood BCTMP producers appear to be suffering, with outright closures looming.

ASPEN PROJECTS. Slave Lake Pulp Corp.'s 110,000-metric-tpy mill in Alberta went online in December and is meeting expectations. The C$182-million joint venture between Alberta Energy and MoDo Canada will supply high-grade printing/writing export markets, with about 25% of production going to North America.

Louisiana-Pacific Canada Ltd.'s new Chetwynd, B.C., mill is currently starting up, said M.B. (Mel) Mountain, general manager-pulping. The C$150-million facility will turn out 157,500 metric tpy of aspen BCTMP for the printing/writing paper market. He said that while "there is no great demand for the fiber now, we feel there is room to absorb it in the part of the market our fiber is going into. We feel the pulp market has bottomed out." As for softwood BCTMP, he expects it will find a home in grades such as newsprint and toweling.

Tembec Inc. is aiming to start up its second softwood/aspen Temcell line in Temiscaming, Que., in September. Some BCTMP will go to its Temboard boxboard machine, but the new 150,000-metric-tpy Temcell II line will raise market BCTMP capacity to 200,000 tpy.

Shin Ho Canada Ltd. is still trying to get permits for a 1992/93 startup for a C$180-million, 160,000-metric-tpy aspen BCTMP pulp mill proposed for Thunder Bay, Ont., said Ken Shin, one of the firm's directors.

Vanderhoof Pulp & Paper Ltd. has finally won an aspen pulpwood agreement from British Columbia. Now the firm is working on a prospectus for the project, which has been previously described as a C$300-million BCTMP mill near Vanderhoof that might be built with Tembec. The company's next move is to enter the Major Project Review Process, a review involving the public as well as the federal and provincial governments. *(See table p. 50.)* ■

TABLE 1: **Mechanical pulping modernization and expansion projects.**

Start date	Cost ($ million)	Company, mill site	Additional information (short tons in U.S.; metric tons in Canada)
1990	—	Alabama River, Claiborne, Ala.	Three-line TMP plant for new $320-million, 220,000-metric-tpy newsprint mill, supplied by Sunds Defibrator; uses 23,000-hp CD 76 primary and secondary refiners and 12,000-hp RGP 60 rejects refiners
1991	—	Inland Empire, Millwood, Wash.	Two CTMP lines will be idled upon startup of a 108-tpd deinking plant, which will allow the mill to make 40% recycled-content newsprint for about half its 66,000 tpy output
None	—	James River, Arnheim, Mich.	A proposed $1-billion, 1,000-tpd coated paper mill, possibly including a CTMP plant, was indefinitely deferred in early 1990 in favor of recycled paper expansion on the West Coast
1990	—	James River, St. Francisville, La.	Installed a new Tampella pressurized groundwood system, the first ever applied to southern pine; a new LWC machine will be installed by 1993
None	—	Madison Paper, Madison, Maine	In early 1990, decided not to install new supercalendered paper capacity and expand pressurized groundwood pulp output; mill is considering adding recycled fiber capacity
1990	38.0	Niagara of Wis., Niagara, Wis.	Rebuilt groundwood pulp mill with new 280-tpd Tampella pressurized groundwood system; included Bailey Controls and Tamsec process controls, Kone Wood log handling and conveyor system, Andritz peroxide bleach plant
1991	300.0	North Pacific, Longview, Wash.	$300-million newsprint expansion includes upgrade of mill's nine TMP refining lines to raise efficiency and output by 20%, or about 94,000 tpy
1990	—	Alberta Newsprint, Whitecourt, Alta.	New $360-million, 220,000-tpy newsprint mill includes Voith CTMP plant
1991	85.0	Boise Cascade, Kenora, Ont.	Build new 470-tpd TMP mill and chip-handling facility, replacing about one-third of existing groundwood pulping operation and eliminating outside kraft pulp purchases; Sunds Defibrator is supplying new plant with two RGP 76 and one RGP 70 conical disc refiners
1992	210.0	Canadian Pacific, Gatineau, Que.	Build a new TMP mill to replace mill's stone groundwood, refiner mechanical, and SCMP systems and eliminate purchases of kraft pulp; project includes paper machine improvements and will result in downsizing of mill from 565,000 to 400,000 tons of newsprint produced from 60% TMP and 40% deinked fiber
1990	105.0	Canadian Pacific, Thunder Bay, Ont.	Built new 245,000-tpy TMP plant for newsprint expansion, replacing No. 1 groundwood mill and modernized No. 2 groundwood mill; new furnish is 45% TMP and 55% groundwood, sulfite, and semibleached kraft
1992	100.0	Cascades, Cabano, Que.	Build a new 120,000-tpy CTMP mill; engineering is complete, but project needs environmental approvals and financing
1990	240.0	Donohue, Matane, Que.	In late 1990, completed new 190,000-tpy market bleached CTMP mill with Rexfor; includes eight 12,000-hp, 64-in. single-disc refiners from Hymac, Du Pont Canada bleaching chemical equipment, Hymac and Ingersoll-Rand bleaching equipment
None	195.0	Fibreco Export, Taylor, B.C.	Double bleached CTMP capacity with another two-line, 180,000-tpy pulp plant; construction expected to begin in two years for completion in 1994
1993	18.0	Fraser, Edmundston, N.B.	Modernize groundwood mill with additional reject refining; in proposal stage
1991	—	Howe Sound P & P, Port Mellon, B.C.	New $355-million, 535-tpd newsprint mill includes a new TMP plant
1991	150.0	Louisiana-Pacific, Chetwynd, B.C.	New 157,500-tpy bleached hardwood CTMP mill with Hymac fiber line, Flakt fluff dryer, Hepburn presses; targeted at printing/writing paper market
1992	330.0	Millar Western, Meadow Lake, Sask.	Build new two-line, closed-loop, aspen-based 240,000-tpy market bleached CTMP mill; passed environmental review in 1990
None	—	Nortek Forest Products, Nipawin, Sask.	Plans to build new 100,000-tpy hardwood market pulp mill using high-yield steam-explosion Stake process fell through in mid-1990 when Kruger decided against joining the project
None	200.0	Orenda Forest Products, Stewart, B.C.	Negotiating financing for new 300-tpd market bleached mechanical pulp mill; closed-loop Tampella chemi-pressurized groundwood system would produce pulp with freeness of 60 CSf and 75 brightness for SC and LWC paper; CPGW system uses alkaline peroxide in the grinder hot loop to achieve first-stage bleaching, followed by a second bleaching stage
1990	147.6	Quebec & Ontario, Baie Comeau, Que.	Built a new 600-tpd TMP mill to replace an existing sulfite plant; Hymac supplied new PRMP system with nine 14,000-hp HSD 60 pressurized refiners
1992	110.0	Scott Paper, Crabtree, Que.	New 300-tpd bleached CTMP plant to supply Scott tissue mills in Quebec; mill will make softwood and hardwood pulp bleached with hydrogen peroxide and hydrochloride
None	180.0	Shin Ho Canada, Thunder Bay, Ont.	Seeking permits for new 160,000-tpy bleached hardwood CTMP mill, proposed for possible 1992-93 startup
1990	182.0	Slave Lake Pulp, Slave Lake, Alta.	Completed new 110,000-tpy market bleached CTMP mill to produce high-brightness pulp for printing/writing paper; Sunds Defibrator supplied pulping equipment, including a three-stage Conical Disc refiner
None	153.0	Stake Tech., Mont Joli, Que.	Progressing with plans to build a bleached hardwood pulp mill using high-yield steam explosion process; 1992 target
1991	40.0	Stone-Consolidated, Shawinigan, Que.	Expand TMP capacity 100 tpd and reduce sulfite pulp output by 25 tpd to help meet environmental standards for effluent; includes addition of a reject refiner, modifications for chip screen plant, TMP lines
None	195.0	Tackama Forest, Fort Nelson, B.C.	Proposed new 190,000-tpy market bleached CTMP mill; 1993 target
1991	120.0	Tembec, Temiscaming, Que.	Boost bleached CTMP capacity 150,000 tpy with a second pulping line, Temcell II; major equipment and high-brightness peroxide bleach plant from Sunds
None	300.0	Vanderhoof P & P, Vanderhoof, B.C.	Proposed bleached hardwood CTMP market pulp mill won an aspen pulpwood agreement recently from the province and must now undergo environmental review; company has been seeking industry partners

ISSUE FOCUS: MECHANICAL PULPING

Use of Groundwood Furnish Driven by Sheet Quality, Environmental Factors

Recent installations indicate SC and LWC mills favor groundwood for bright, strong pulp at reduced chemical and energy cost

By KEVIN L. BURKETT and HARRI NERG

Groundwood printing papers represent the most efficient use of the forest resource for paper manufacture. The high scattering coefficient of mechanical pulps provides high opacity at relatively low grammage. These grades are primarily used in advertising printing and have experienced very healthy demand growth in the last ten to 15 years.

This trend is expected to continue in the 1990s. However, demand for some grades will grow much faster than others. The trend in developed countries is toward higher-value-added products, higher quality, and market segmentation/diversification. This is demonstrated by more use of color in printing, increased use of coating and fillers, and a wider range of grades (e.g., brightness, finishes, and basis weights).[1]

The high costs and environmental issues associated with the manufacture of chemical pulps have driven the development of processes that will produce a substitute for these pulps in most grades of paper and tissue. During the early 1970s, the thermomechanical pulp (TMP) process became so popular that many industry analysts began to seriously doubt the future of the groundwood process.

The ability of TMP to consume sawmill residues and produce byproduct steam for use by an integrated paper machine made it particularly attractive for newsprint production. Its further development into chemi-thermomechanical pulp (CTMP) and other chemi-alphabet pulps further threatened the future of groundwood.

The drive to develop the chemical replacement, or reinforcement pulp, has made significant progress. As a reinforcement pulp, CTMP strength properties are beneficial. However, the production of fine printing grades, particularly coated grades, requires properties that refiner pulps do not easily attain.

For example, low fines content means that for lower-basis-weight paper grades, both porosity and sheet surface roughness increase. Light scattering coefficient and opacity are reduced. It is in this area that groundwood pulps find their niche. Groundwood is often referred to as a "filler" pulp, but this term is misleading; it is a "printing" pulp. For this reason more than any other, groundwood systems still exist.[2]

The groundwood process is more than 150 years old, and during the period of intense development of refiner-mechanical pulp systems, comparable development of the groundwood process was minimal. To compete with new refiner systems, improvements in groundwood technology were necessary.

Advances in control systems have reduced staffing requirements and increased pulp quality uniformity. The development of the pressurized groundwood (PGW) process certainly played a role in groundwood's return to respectability. PGW offers significant strength improvements over stone groundwood (SGW) without sacrificing any optical properties or increasing energy requirements.

ST. MARY'S PAPER. In 1987, St. Mary's Paper Inc., Sault Ste. Marie, Ont., initiated an expansion/modernization project designed to ensure the mill's future in an increasingly competitive marketplace. At that time, St. Mary's produced 82,000 tpy of SC-B paper and 32,000 tpy of 70 brightness machine-finish (MF), clay-filled paper.

The mill installed a new twin-wire machine, PM 5, with a trim of 4.67 m (184 in.). St. Mary's realized the potential demand for its product and wanted a machine capable of producing SC-A grades if it chose to enter that market.

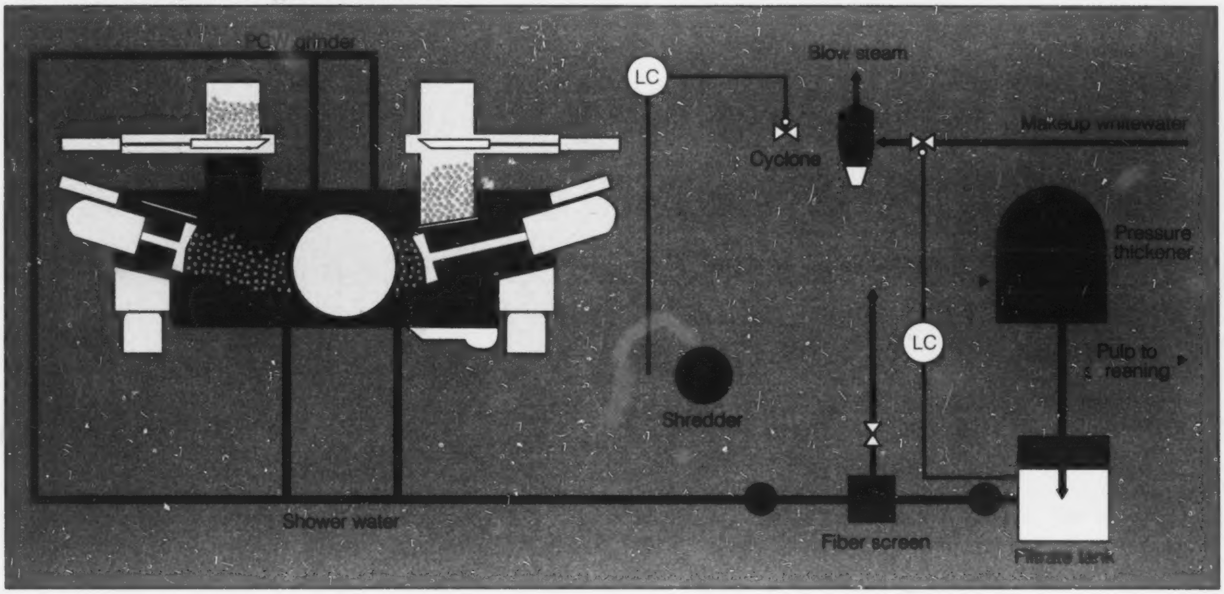
In addition to PM 5, the $157-million expansion program included two supercalenders, another winder, and additional groundwood capacity in the pulp mill. Commonwealth Construction was chosen to provide the turnkey installation of the machine, and Tampella was selected to supply the new machine and new grinders. In addition, the groundwood mill screen room was re-

---

Mr. Burkett is sales engineer and Mr. Nerg is product manager, Tampella Paper Machinery Inc., Atlanta, Ga.

This article was presented at the CPPA Mechanical Pulping Committee Meeting in Sault Ste. Marie, Ont., Mar. 19, 1991.

FIGURE 1: **Flow diagram of a typical PGW process.**



configured with the addition of four new Centrisorters and a new Bird five-stage centrifugal cleaner system to improve pulp quality significantly.

PM 5 was designed to be one of the world's fastest supercalendered (SC) paper machines, with a design speed of 1,400 m/min (4,600 fpm) and a planned operating speed of approximately 1,200 m/min (4,000 fpm). It is the first machine installed in Canada designed specifically to produce SC paper grades. PM 5 has a headbox slice width of 5.04 m (198.4 in.) and a trim of 4.67 m (184 in.). It is designed to run a furnish consisting of 68% SGW, 20% semibleached kraft, and 12% clay. It will operate in a grammage range of 42 to 60 g/m^2 (28 to 40 lb/3,300 ft^2), with a design grammage of 50 g/m^2 (33.5 lb/3,300 ft^2). Target production is 375 tpd.[3]

The existing 1950s-vintage groundwood mill consisted of four Koehring Waterous grinder lines (Nos. 1 through 4), each equipped with two 1.7-m- (67-in.-) dia × 1.4-m (54-in.) face stones driven in tandem. Wood in 1.2-m lengths was hand-fed to these four grinders by a crew of seven per shift from a conventional water flume arrangement.

As part of the modernization, four Tampella T-1812 atmospheric grinders were installed. The grinders, in tandem arrangement, are equipped with 1.8-m- (71-in.-) dia stones with 1.5-m (57.9-in.) faces. The tandem lines are driven by C.G.E. 10,500-kW (14,000-hp), 300-rpm motors. Each grinder is equipped with electrically driven stone sharpening lathes.

An FMP-Rauma automated wood-feeding system has been installed on all grinders except No. 1, which will be held in reserve and hand-fed when required. Fully operational, the capacity of the groundwood mill will be 600 tpd. Staffing requirements are three to four people per shift.

The groundwood mill at St. Mary's has been retrofitted with a modern process control system. There are three components in the control system: a Measurex Vision 2002 DCS (distributed control system), an Allen-Bradley PLC (programmable logic controller), and a local control panel. The Vision system controls the grinder load system, the peak load control system, and the grinder shower water flow. The PLC controls the pocket charging system and the lubrication and hydraulic system controls. These systems can be accessed through the Vision terminal. The local control panel acts as an interface with the operator.

Decreased maintenance and staffing requirements have been the most significant benefits associated with the pulp mill modernization.

LAKE SUPERIOR PAPER. Lake Superior Paper Industries began making paper in November 1987 in a state-of-the-art greenfield SC-A papermaking complex at Duluth, Minn. It is a joint venture of subsidiaries of Pentair Inc. and Minnesota Power. LSPI has the capacity to produce 240,000 tpy of SC paper.

After extensive study, the PGW process was selected to produce mechanical pulp for the mill's single Voith Duoformer paper machine. The Tampella PGW process differs from conventional grinding in two respects:

- The grinding occurs under overpressure.
- The shower water temperature is high—e.g., in excess of 90°C.

Pulp from the pressure grinder passes through the shredder (which reduces slivers to matchstick size) to an atmosphere blow cyclone. The flash steam from the dilute pulp suspension (1.5% Cs) is separated in the blow cyclone and can be utilized in heat recovery systems. Pulp from the cyclone, at 100°C, is delivered to a thickening stage.

Most of the hot filtrate is recovered and recirculated back to the grinders as shower water. This hot shower water circulation is a completely closed system and is described as the "hot loop" (Figure 1). Shower water temperature can be maintained at more than 90°C without any external heat makeup.

At LSPI, the hot loop includes six Tampella T-1812P pressure grinders. Each grinder is equipped with a 7,000-hp synchronous motor rotating at 327 rpm. All of the equipment within the hot loop is controlled through a PLC-based Tamsec system. Since a variety of different control modes can be employed simultaneously on different grinders, freeness and quality control are greatly enhanced. The pulp mill is designed to produce 420 oven-dry short tpd at 60 CSf.

From the project's inception, the owners were determined to build a mill that was modern not only in its design and technology but also in its social systems. LSPI has employed a sophisticated team management concept since day one. Before the mill opened, LSPI recruited skilled operating managers and technicians to form an 81-person core group of experienced papermakers with average industry experience of 12 years. Other technicians were recruited locally, and two-thirds of the 323-person mill staff came from the Duluth area.

Jack LaVoy, vice president of government and public relations for LSPI, explains that cooperative management stresses consensus building. Instead of obeying direct orders handed down from a supervisor, each "team" contributes the knowledge and experience of its members to the process of problem solving and goal setting by consensus development. "It takes more time to reach a decision, but that decision is better than ones arrived at by individuals," LaVoy said.[5]

Being a team member is just the beginning for employees at the Duluth mill. In addition to mastering the skills necessary to do their own tasks, LSPI technicians are expected to develop related skills through the mill's "demonstrated performance" system.

"People earn additional base pay by learning new skills," said LaVoy. "Each team member is encouraged to develop two to four skills other than their base skill. That gives them the opportunity to have a more interesting work life, and it gives the mill more flexibility in mill staffing. Therefore, the need for spare crews and vacation relief is eliminated."

> *Pulp strength properties were maintained and smoothness and porosity improved significantly with* PGW. *Bleach brightness improved without a loss in opacity.*

BLANDIN PAPER. Blandin Paper Co. has been in the business of making groundwood-based paper since the turn of the century. It is a single-site mill located on the Mississippi River, about 75 miles northeast of Duluth and about 125 miles due south of International Falls, Minn.

Blandin Paper is a subsidiary of Fletcher Challenge Canada Ltd., which in turn is owned by Fletcher Challenge of New Zealand, an ownership that is indicative of the continuing global integration of the forest products industry.

Blandin is a direct sales mill with sales offices in Chicago, Ill., and New York, N.Y., handling its web offset and rotogravure grades, principally No. 5 lightweight coated (LWC).

In summer 1989, Blandin completed a $350-million expansion. Included in the expansion were a new woodroom, PGW mill, LWC paper machine, shipping area, and clay preparation area.

Blandin's new woodroom was designed for separate processing of hardwood (HW) and softwood (SW) species, located in proximity to a modern cogeneration plant installed in 1980. Fall-down from wood preparation provides fuel to this facility.

The new PGW mill, which started up in July 1989, is located next to the new woodroom. Tampella supplied nine pressure grinders with auxiliaries, a Tamsec grinder automation system, a fully automated Kone Wood log charging system, three Rauma-Repola pressure-washer-thickeners, and 16 Tampella pressure screens.

The Tampella grinders are equipped with the latest development in grinder automation—computer-aided pulpstone lathes. The new mill, in addition to being the largest PGW mill for LWC grades, is one of the world's most modern, with fully automated log feeding and grinder control.

The pulp mill layout is for ten grinders, with nine in the initial delivery. Five grinders are dedicated to aspen, with the remaining four to spruce/balsam. The grinders are in a tandem drive arrangement, with power supplied by one 14,000-hp and four 13,000-hp motors. Peak production of the new PGW mill using ten grinders is 650 bone-dry short tpd. Average specific energy consumption for aspen (150 ml. CSf at pit) is 1,000 kWh/ton, and for spruce/balsam (100 ml. CSf at pit), 1,250 kWh/ton is typical.[6]

The new PGW mill replaced existing softwood SGW (140 tpd) and hardwood TMP (165 tpd) systems. Blandin selected the PGW process for the following reasons, in order of importance:[7]

1. Improved quality
    - A. Print smoothness
    - B. Pick strength

   C. Brightness
   D. Tear strength
2. Cost efficiency
   A. Energy
   B. Bleaching chemicals
   C. Kraft savings.

The pulp evaluation averages show significant improvements in the properties that are traditionally associated with pressroom runnability and printability. Pulp strength properties were maintained and smoothness and porosity improved significantly with PGW. Bleach brightness improved without a loss in opacity. This confirms results obtained earlier in the pilot plant, and the option is open to seek further improvements by alkaline peroxide additions to the PGW hot loop.

> *Of particular interest is that PGW provides even better quality improvements on pine than . . . on spruce—for example, a 100% improvement in tear strength.*

Progress on CPGW was recently reported in a paper by Haikkala et al.[8] The experience at Blandin in replacing TMP with a modern groundwood pulp is similar to that reported by Jensen et al. in 1989.[9] In that comprehensive pilot-plant-scale study using *Pinus radiata*, the PGW furnish provided superior opacity, brightness, porosity, and smoothness to competing mechanical pulping processes.

LWC groundwood printing papers have stringent quality standards. The decision to use PGW to modernize and expand the pulping capacity at Blandin was the result of several years of planning, which included pulping trials conducted at the Tampella Research Center at Inkeroinen, Finland. In particular, the opportunity to obtain a high-quality papermaking furnish from an overmature wood resource was a significant benefit.

The modernization project included the replacement of PM 1, a small, 32,800-ton 1900 vintage machine. Pressroom paper samples of several grades were sent to an independent laboratory for testing. All of the mechanical pulp in these pressroom samples, representing up to 67% of the furnish, consisted of PGW.

NIAGARA PAPER. Niagara of Wisconsin Paper Corp. in Niagara, Wis., a subsidiary of Pentair Inc., is 101 years old this year. However, its production is strictly state of the art. Niagara produces high-quality groundwood printing papers marketed under the trade names of Niagara Book, Pentair, and Penagara. The mill's production is targeted for 720 tpd of Nos. 4 and 5 coated papers, with basis weights ranging from 40 to 70 lb/3,300 ft^2.

PGW pulp was produced at Niagara Paper for the first time in February 1990. The new 280-tpd PGW system is part of an overall plan to continue the modernization and expansion of the Niagara mill. On completion of the PGW project, five existing atmospheric grinders were shut down. The system, which includes four T-1812P pressure grinders, is housed in a new building. Each of Niagara's grinders is driven by a 7,000-hp (5-MW) motor. The nominal log length is 4 ft (1.2 m), and the furnish is 100% aspen.

A 100-ton-capacity, live-bottom bin supplied by Kone Canada is interconnected by supply conveyors to automatically deliver wood to the grinder charging system. Wood charging to the grinder pockets is done with a fully automated Kone system supplied by Tampella. Grinder casing design pressure is 34 psi (3 bar), and target pit freeness is 180 to 200 CSf.

Internal PGW process heat recovery within the pulp mill hot loop is by Hedemora low-pressure disc filter. The diluted pulp from the new system is pumped to an existing screening and reject handling system, which was rebuilt and modernized.

Grinder control is automated with the standard Tampella Tamsec system, which also provides process reports. This system provides the mill with detailed control of the grinders and auxiliary system and with advanced methods of controlling the grinding. From the start, the mill has used the "programmed shoe speed" mode of operation since this represents a good compromise between pulp quality and production.

For the screening and bleaching operations, a Bailey Network 90 DCS was purchased. The purpose of this system was to take over all control in the screen room and bleachery areas, previously handled with analog control, push buttons, or PLCs or by hand. This included all control of the reject refiners and twin-wire presses, which have been more typically done using PLC or relay logic.

To ensure a smooth transition with the addition of this new technology, the mill placed a premium on training of personnel. Key personnel were immersed in training programs three months before startup. To foster a sense of ownership, the operators were involved in designing graphics for the DCS, designing control strategy, and purchasing equipment. A Tamsec process simulator proved to be a useful tool in training the operators, whose previous experience was hand-feeding logs into grinders. The ability to practice on the simulator built confidence and helped overcome any technological culture shock.

The result was that the operators were ready to handle the system when it was operational. The operators were so ready, in fact, that shifts now function without supervisors. Operators have taken on more responsibility and are solving their own problems.[10]

The main day-to-day control parameter for Niagara's groundwood quality is the decker freeness. The operators make changes at the grinders and in the screen room to adjust to the freeness target. The deviation in freeness has been reduced by 40%, a direct result of improvements in the technology.[11] Niagara's primary strength measurement is burst. Burst has increased 24% to 36% with the startup of the new PGW mill.

JAMES RIVER. James River Corp.'s St. Francisville, La., mill faces unique challenges as quality standards rise. U.S. southern pine species, such as loblolly pine (*P. taeda*) and slash pine (*P. eliottii*), are characterized by relatively thick-walled, poor-bonding fibers and a higher percentage of darker summerwood content.

As a result, more energy is required in mechanical pulping, and the resultant pulp is often darker than the pulp produced from northern wood. Northern spruces have thinner-walled fibers, which fibrillate better, producing stronger and brighter pulps with less energy consumption.

The following data compares typical fiber dimensions of two softwood species commonly used in groundwood pulping—northern black spruce and southern loblolly pine:

	Black spruce	Loblolly pine
Length, mm	3.5	4.0
Dia, um	30 to 25	50 to 35
Cell wall thickness, um	1 to 3	3 to 8

PGW performs very well on a typical northern softwood (such as spruce) and on low-density hardwood (such as aspen in the North and cottonwood in the South). Of particular interest is that PGW provides even better quality improvements on pine than those experienced on spruce—for example, a 100% improvement in tear strength. In addition, PGW provides 5% to 10% reduction in energy consumption, especially with low-freeness pulps, than conventional pine groundwood. These improvements are achieved with retention of good printing properties.[12]

With the startup in September 1990 of the new PGW mill at St. Francisville, the James River mill becomes the first in North America to exploit the benefits of the PGW process on a southern furnish for LWC paper.

The three-grinder system produces 180 tpd of pulp for the mill's two LWC paper machines. Each 1.6-m grinder is driven by an 8,000-hp motor. Cottonwood and southern pine are co-ground. In addition to the automatic log-feeding system, pressure grinders, and hot loop auxiliaries, the project scope included modernizations of the reject refining, screening, cleaning, and postrefining systems and space for three additional grinders.

The selection of PGW was based on the following considerations:

- Kraft pulp reduction: greater strength of PGW pulp compared with the replaced SGW allows for the reduction of kraft content.
- Maintenance cost: replacement of vintage grinders with a modern PGW system significantly reduces maintenance costs.
- Titanium dioxide: ability to increase the furnish's mechanical pulp fraction improves opacity and reduces the need for expensive titanium dioxide.
- Labor costs: installation of a modern, fully automated PGW system offered significant benefits in terms of reduced operating labor requirements. ■

TABLE 1: **Modern groundwood/PGW mills.**

Company/location	Capacity (000 metric tpy)	Wood furnish	Startup date	Market grade
Madison Paper Industries, Madison, Maine	100	Spruce/fir	1981	SC
St. Mary's Paper Inc., Sault Ste. Marie, Ont.	100	Spruce/fir	1988	SC
Lake Superior Paper Industries, Duluth, Minn.	160	Spruce/fir	1987	SC
Blandin Paper, Grand Rapids, Mich.	200	Aspen/ spruce	1989	LWC
Niagara of Wisconsin, Niagara, Wis.	100	Aspen	1990	MWC
James River Corp., St. Francisville, La.	65	Cottonwood/ southern pine	1990	LWC

SC = Supercalendered "A/B" used principally for catalog and advertising insert market.
LWC = Lightweight-coated magazine paper.
MWC = Medium-weight coated for magazine and book papers.

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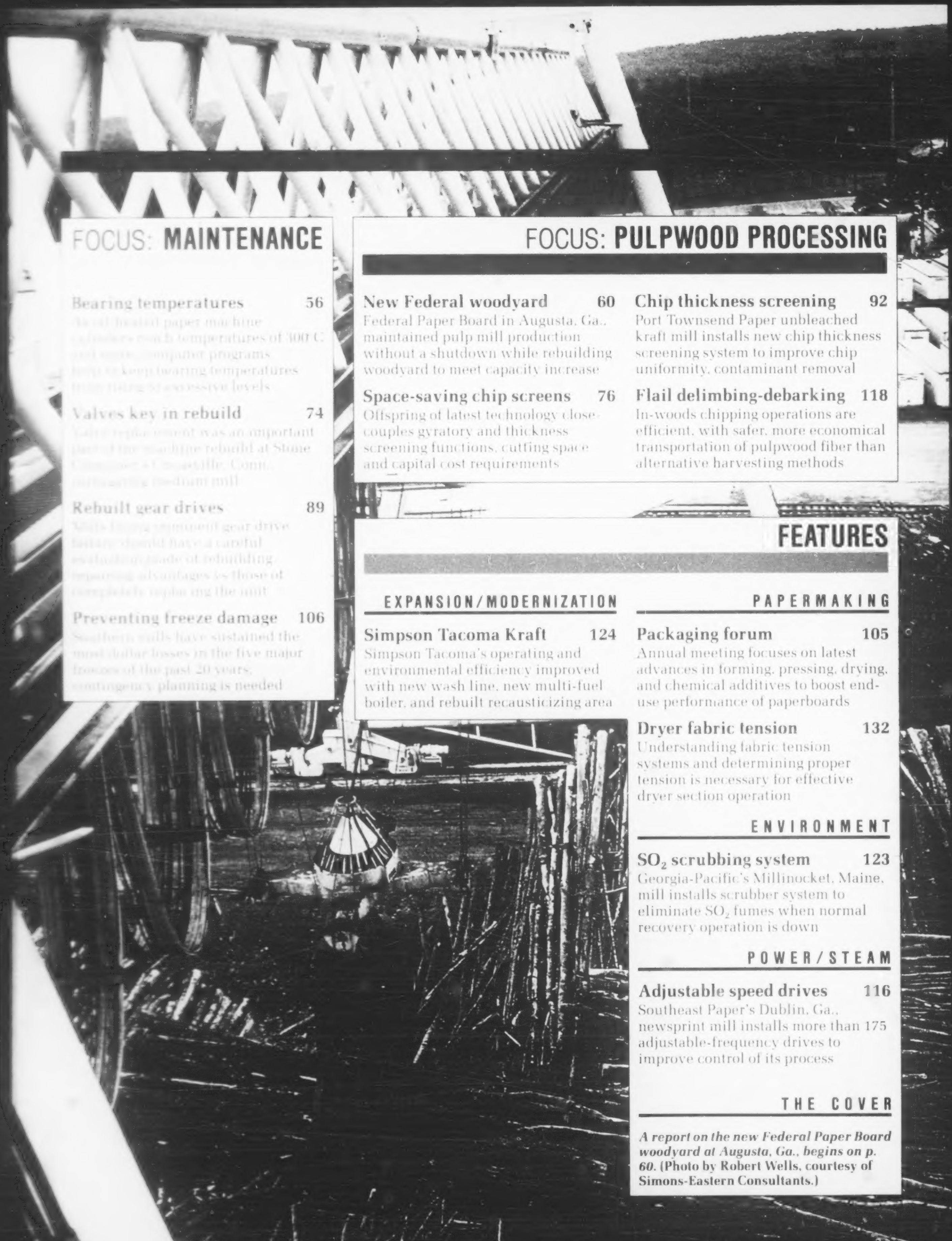

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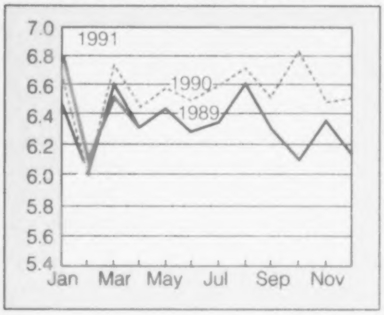
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.3 million tons in April, according to the American Paper Institute, down 0.9% from the same month last year. The seasonally adjusted rate was 38.1 million tpy for paper, down 2.1% from a year earlier, and 39.4 million tpy for paperboard, up 1.0%. Much of the weakness in paper was concentrated in the printing/writing grades, API reported. Paperboard benefited from a 12.6% increase in production for export and a large increase in folding boxboard production due to the startup of Mead Corp.'s new machine in Mahrt, Ala.

Among major grades, printing and writing papers were off 5.4% from last year due to recession-related cutbacks in all major end-use categories. Containerboard production for domestic use was up just 0.2%, but production for export rose 15.7% through April. Market pulp production posted a 3.5% gain during the first quarter.

Canadian newsprint shipments totaled 748,000 metric tons in March, down 9.3% from a year earlier (April figures were unavailable at press time). Woodpulp shipments dropped 9.2% to 593,000 tons. Shipments through the first quarter were off 2.1% for newsprint and 3.7% for market pulp. ■

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Apr.	573	5.9	6,739	4.6
Uncoated groundwood (s)	Apr.	130	-7.1	1,661	-5.3
Coated paper (s)	Apr.	553	70.7	7,014	-4.0
Uncoated free-sheet (s)	Apr.	904	-6.6	10,900	-6.0
Other printing/writing	Apr.	128	300.0	1,531	-5.8
Total packaging and other paper (s)	Apr.	381	0.5	4,558	0.1
Tissue	Apr.	477	2.1	5,781	1.8
Total paper	**Apr.**	**3,146**	**-0.7**	**38,187**	**-2.0**
Unbleached kraft paperboard	Apr.	1,595	-2.0	20,231	2.4
Semichemical medium	Apr.	463	-0.6	5,649	0.6
Bleached paperboard	Apr.	9	-97.6	-4,557	0.5
Recycled paperboard	Apr.	730	-0.1	8,860	-1.5
Total paperboard	**Apr.**	**3,167**	**-1.1**	**39,296**	**1.0**
Total U.S. paper and paperboard output	**Apr.**	**6,313**	**-0.9**	**77,482**	**-0.5**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Mar.	5,316	0.8	63,710	2.0
Market pulp production	Mar.	744	2.3	9,057	3.5
Wastepaper consumption at paper/board mills	Mar.	1,817	0.7	21,208	3.8
Pulpwood consumption (cords)	Mar.	8,161	-2.2	100,308	0.3
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft^2)	Apr.	28.033	4.3	104.130[6]	-1.7
Containerboard inventories at U.S. box plants and mills	Apr. 1	2,995	14.0		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Mar.	988	-14.2	12,406	-5.9
Imports of Canadian newsprint	Mar.	624	-13.6	7,821[6]	-7.1
U.S. paper exports (including products)	Mar.	722	20.9	8,047	19.9
Exports of unbleached kraft linerboard	Mar.	288	23.1	3,124	22.2
Exports of woodpulp	Mar.	600	3.8	6,245	10.9
Norscan pulp inventories[4]	Apr. 30	1,559	12.3		
Norscan pulp operating rates[4]	Apr.	85%	88%	98%	90%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Mar.	748	-9.3	2,211[6]	-2.1
Operating rates	Mar.	90%	95%	93%	94%
Inventories held by U.S. consumers	Mar. 31	1,430	13.8		
Other paper/board shipments	Mar.	593	-9.2	1,757	-3.7
Woodpulp shipments (export only)	Mar.	721	3.3	2,101	9.4
Operating rates	Mar.	92%	90%	92%	93%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Bleached paperboard: Producers are adding capacity to meet demand for SBS packaging

Grade structure: Solid bleached sulfate (SBS) paperboard is used primarily for folding carton and milk carton packaging. SBS is a premium cartonboard stock made from a furnish containing at least 80% virgin-bleached woodpulp. It is also used for cups and plates, food containers, and preprint linerboard. Calipers range from 12 to 28 pt, in low, medium, and high density, and basis weights vary from 40 to 100 lb/1,000 ft². Most SBS is clay coated for retail packaging or polyethylene coated for food packaging.

Markets: The major markets for SBS are folding boxboard, 51.3%; milk carton and food service, 39.5%; linerboard, 3.6%; and other packaging, 5.6%. These figures represent the 1991 capacity allocations published by the American Paper Institute. Some lightweight SBS board is also used for specialty printing applications, such as baseball cards.

Production/capacity: Total SBS production in 1990 declined 2.7% to 4.399 million tons. The decline in output was caused by several machines being temporarily idled for major rebuilds. International Paper Co., Federal Paper Board Co., Potlatch Corp., and Georgia-Pacific Corp. all took downtime to improve product quality and raise capacity. These projects are all scheduled to be completed by mid-1991. Last year, some machine capacity was reallocated from production of bleached packaging paperboard to bleached printing bristols and bleached market pulp.

In 1991, total SBS capacity is projected to increase by 4.8% to 4.843 million tons. Capacity will remain at approximately this level until late 1993, when Westvaco Corp. is scheduled to complete construction of a new 350,000-tpy SBS board machine at its Covington, Va., mill.

Several mills that produce SBS packaging board also manufacture lightweight bleached bristols used by commercial printers for paperback book covers, greeting cards, postcards, tickets, etc. Total bleached bristol capacity is projected to increase by 3.4% to 1.412 million tons in 1991. In 1990, bristol production increased by 2% to 1.188 million tons, and 1991 production should be about the same. Bleached bristols are not included in the bleached packaging board capacity and production figures.

Outlook: A modest recovery in consumer spending and retail sales in second-half 1991 will improve demand for all grades of paperboard packaging. This should boost domestic shipments of SBS folding carton, milk carton, and food service packaging by about 2 to 3%. Exports also will remain strong, showing about 3 to 5% growth because U.S. mills are the major suppliers of bleached paperboard used for liquid packaging worldwide. At the same time, the completion of major capital programs will remove the capacity constraints that have limited growth in the past two years.

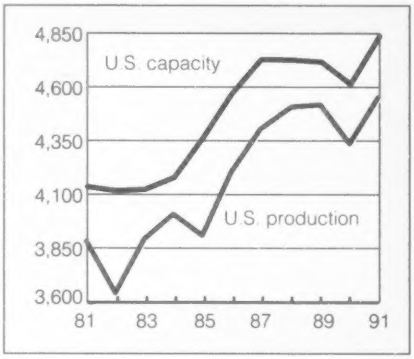
Assuming that an economic recovery begins in the second half of this year, total SBS production is forecast to increase about 3.6%. If the national economy recovers at a slower pace, SBS production will increase only 2 to 2.5% above the 1990 level. Since SBS capacity will increase by nearly 5% in 1991, SBS operating rates are forecast to decline to 94%.

Prices: All major SBS cartonboard producers have announced price increases amounting to about $40/ton. The first price hikes were scheduled to take effect beginning June 1, 1991. Because the effort to raise prices has received industry-wide support, it is reasonable to expect that the price of premium SBS clay-coated folding cartonboard will increase from $830/ton to $870/ton in 1991. The last price increase for these grades was a $50/ton hike in August 1989.

Bristol prices increased about $40/ton in April 1991, when the first effort to raise cartonboard prices was made but rejected by customers. The benchmark price for 10-pt coated one-side printing bristols is now approximately $1,070/ton (rolls).

Historical prices for solid bleached, clay-coated, 15-pt folding carton boxboard (rolls, $/short ton, year-end prices) are as follows: 1980, $550; 1981, $625; 1982, $590/625; 1983, $590/625; 1984, $590/665; 1985, $500/590; 1986, $580/590; 1987, $635; 1988, $730; 1989, $830; 1990, $830. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1989	1990	1991
Production[1]	4,521	4,399	4,557e
Capacity[1]	4,723	4,619	4,843
Utilization rate	95.7%	95.2%	94.1%
Imports	20	40	30
Exports	693	734	755
Apparent U.S. consumption	3,848	3,705	3,832
lb/capita	31.0	29.7	30.6
GNP ratio[2]	0.93	0.89	0.91

[1] American Paper Institute production, capacity data.
[2] 000 tons/$ billion real GNP.
e = *Pulp & Paper* estimate.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity (000 tons)	Market share (%)
1. International Paper[1]	905	18.7
2. Federal Paper Board	680	14.0
3. Westvaco	620	12.8
4. Potlatch	554	11.4
5. Georgia-Pacific	370	7.6
6. Temple-Inland	300	6.2
7. James River	270	5.6
8. Champion International	265	5.5
9. Gulf States Paper	230	4.8
10. Weyerhaeuser	230	4.8
11. Gilman Paper	200	4.1
12. Jefferson Smurfit/CCA	185	3.8
13. Union Camp[2]	140	n.a.

Market share of top five companies:
64.6%

Market share of top ten companies:
91.4%

Total U.S. capacity (1991):
4.843 million short tons

[1] Will take 44 days downtime to complete Texarkana, Texas, machine rebuild. [2] Includes more than 50% board/bristol swing capacity. n.a. = not available.

TISSUE

Markets turn "squeezably" soft in recession

Tissue producers are being chilled by the recession following many years of slow but steady growth in the U.S. "What's happening in tissue is a lot better than linerboard or uncoated free-sheet," acknowledged George Adler, an analyst with Smith Barney, Harris Upham & Co. Nevertheless, tissue is "recession-resistant but not recession-proof." First-quarter earnings are down, and some major projects have been delayed or canceled, while new products have churned up competition and prices are static or slightly depressed. And the away-from-home market has suffered some because of its ties to employment and traveling.

Tissue production and consumption both grew each year from 1983 to 1990. Production in 1990 reached 5.802 million tons, according to the American Paper Institute. Analysts expect production will be in the range of 5.78 to 5.85 million tons this year. API figures indicate production in the first two months of 1991 was off 0.2% from the same period a year earlier, although Jeanne Carroll, an analyst with Morgan Stanley & Co. Inc., estimated production rose about 1% for the first quarter. Analysts estimate that 1990 capacity reached 5.97 million tons and operating rates stood at 96% to 97%; capacity should grow to 6.11 to 6.14 million tons this year for an operating rate of 95% to 96%.

On the whole, "the U.S. tissue market will remain favorable over the next few years because of limited new supply and favorable pricing of raw material," said Carroll. A number of tissue projects were announced last year, including two James River Corp. machines at Naheola, Ala., and Old Town, Maine; two Procter & Gamble Co. machines east of the Rockies; and a Scott Paper Co. recycled tissue mill in Kentucky, but "the only thing that has been put through is the second P&G Oxnard, [Calif.,] machine," Adler said. He dismisses these other projects as "posturing" and said they are "on the back burner." Evadna Lynn, analyst with Dean Witter, blames the delays on cash flow pressures at the companies and management's concern with the state of the economy.

Kimberly-Clark started it. "Domestic tissue markets have apparently become somewhat more competitive as demand from retailers has slowed a little," said Mark Diverio, an analyst with Shearson Lehman Brothers Inc. Increased supply is also at work. Kimberly-Clark Corp. shook up the business when it dove back into the U.S. premium consumer bath tissue market in 1990. Since then, "tissue producers have become more competitive from a pricing standpoint as Kimberly-Clark, P&G, James River, and [Scott] slug it out in the higher-quality bath tissue arena," Diverio said. The analyst said heavier promotional activity is now spreading beyond the south central and southeastern markets, where K-C's effort was initially focused, although Smith Barney's Adler said the competition has not yet reached the Northeast or the West Coast. However, it has prompted some national chains to buy tissue in the cheaper regions and ship it to other market areas for sale. The backlash against K-C is not limited to premium bath tissue, Adler noted. The towel market has also been affected, although diapers and facial tissue have so far been spared, he said (Kimberly estimates it holds 8% of the towel market).

Mark Rogers, an analyst with Prudential Securities, agreed. "Promotional activity has started to become more intense in the commercial and industrial [C&I] market as well." But Rogers added that both the fourth quarter and first quarter are traditionally slower months for the industry, and he expects industry earnings could improve in the second quarter if C&I promotion does not get out of hand. And Carroll pointed out that "with the U.S. tissue industry operating at 96% to 97% of capacity, we expect promotional activity to abate in a stronger economy in 1992."

The producer price index for tissue, which bounded up 10% in 1989, backed off to 7% growth last year and is hovering around 2% growth in first-quarter 1991. But this index does not reflect the impact of promotions. Dean Witter's Lynn said tissue producers' actual realizations "creeped up through most of last year but are probably down in commercial and premium bath tissue and relatively stable in the remainder of markets." Morgan Stanley's Carroll said con-

North American tissue expansions.

Company/mill	Annual capacity (short tons)	Startup date
Irving Tissue Co., St. John, N.B.	n.a.	1990
Atlantic Packaging Inc., Whitby, Ont.	30,000	1990
Kimberly-Clark Corp., Loudon, Tenn.	50,000e	1990
Kimberly-Clark Corp., Jenks, Okla.	75,000	1990
Cascades Corp., Kingsey Falls, Que.	28,000	1990
Wisconsin Tissue Mills, Menasha, Wis.	80,000	1990
Putney Paper Co. Inc., Putney, Vt.	5,000[1]	1990
Pope & Talbot Inc., Ransom, Pa.	7,000[1]	1990
Canadian Pacific Forest Products Ltd., Toronto, Ont.	n.a.	1990
Scott Paper Co., Chester, Pa.	20,000	1990
Perkins Papers Ltd., Candiac, Que.	48,500	1991
Fort Howard Corp., Rincon, Ga.	88,000	1991
Scott Paper Co., Chester, Pa.	n.a.	1991
Mosinee Paper Corp., Middletown, Ohio	90,000	1991
Procter & Gamble Paper Products Co., Oxnard, Calif.	85,000e	1992
Potlatch Corp., Lewiston, Idaho	39,000[2]	1992
Consumers Paper & Supply Corp., Redcliff, Alta.	28,000	1992
Kimberly-Clark Corp., Loudon, Tenn.	50,000e	1993
Fort Howard Corp., Green Bay, Wis.	n.a.	1993

n.a. = Not available. e=Estimate.

1. Estimated capacity addition from rebuild.
2. Net capacity addition.

Source: *Pulp & Paper Week*; analyst estimates.

sumer tissue realizations are down 1% to 2%, excluding premium bath tissue. In the South, smarting from K-C's new product, premium consumer bath tissue transaction prices are probably 20% below normal, and in other regions they are down just 8% to 10%, she said. Lower-end commodity grades in the away-from-home market have seen some price slippage since the third quarter, but "the rest of the grades are holding up well in the first quarter," she added. An across-the-board price increase of 3% to 5% announced in the fourth quarter will be "hard to get now because of the weaker economy." With most producers running "close to full out," Carroll expects trade allowances to drop off fairly quickly when the economy turns around.

Times tough for now. While Scott's unit volume in first-quarter 1991 remained nearly even with first-quarter 1990, the firm's U.S. tissue operating income dropped 10%. It should be noted, however, that 1990 was a record year for the firm in terms of U.S. tissue earnings; unit sales were essentially level with 1989, but the average selling price for consumer and commercial tissue rose about 4%, Scott said. The company said that its performance in the U.S. tissue business during the first quarter was "negatively impacted by strong competitive activity across the business."

Scott shut down its mill in Winslow, Maine, from June 23 to July 8 to work down inventory; the facility produces some basesheet for the firm's Westbrook, Maine, printing papers mill but is primarily focused on commercial tissue (a spokesman said that such downtime is not unusual for Scott as a whole). Scott has delayed its $200-million Owensboro, Ky., tissue mill project, saying in its annual report that construction will begin in 1992 rather than this year as it had originally indicated.

Sometime this year the company plans to start up a rebuilt machine at its tissue and toweling mill in Chester, Pa., where another rebuilt machine that had been idled went online toward the close of last year. Dean Witter's Lynn estimates that the first rebuild added 20,000 tpy. Scott continues to divest units in order to focus on its core businesses, which include commercial and consumer sanitary tissue, wet wipes, and wipers, so it can "improve future earnings, cash flows, and returns."

Mosinee Paper Corp. expects Bay West's rebuilt No. 1 60,000-tpy machine to start production of commercial toweling stock in the third quarter at its Middletown, Ohio, mill, along with more deinking capacity. Installation of a new "world class" 30,000-tpy twin-wire tissue machine is due there late in the year. Mosinee said mill production will be sufficient to supply the converting operation at double its 1990 output of 42,000 tpy. And once integration is complete the company can stop buying parent rolls of towel and tissue stock from competitors, "drastically" reducing raw material costs. The company noted that relocation of its converting operation from Wisconsin to Kentucky, near the Middletown mill, will yield savings in freight, labor, and other business costs.

Kimberly-Clark enjoyed gains in shipments of children's training pants and feminine care and bathroom tissue products in the U.S. as well as Canada and overseas during the first quarter. K-C, which buys 650,000 tons of pulp each year, has benefited from sinking pulp prices, noted Oppenheimer & Co. Inc.

On the other hand, the company's introduction of premium consumer Kleenex bath tissue, made at the new Jenks, Okla., facility, is expected to help drain away $1.08 billion in total promotional costs this year on top of the $985 million spent last year, this analyst said. K-C plans to start up a third tissue machine at its new Loudon, Tenn., mill, along with related deinking and converting equipment. Carroll predicts the machine could come on in first-half 1993 with capacity of 50,000 tpy. The facility produces 100%-recycled Surpass and Regard brand commercial bathroom tissue.

James River's first-quarter consumer products sector in the U.S. was impaired by "increased competitive activity in the retail area as well as weakening markets in the commercial side of the business." And James River warns that "additional industry capacity is expected later in 1991 for . . . tissue, which, coupled with continued recessionary pressures, may cause results to continue to be depressed until market growth capacity.

Procter & Gamble confirmed it is going ahead with its Oxnard tissue mill expansion, although timing is not yet definite. A team evaluating a $250-million project involving two new machines at an existing plant east of the Rockies has so far made no recommendation.

Canadian blues. As in the U.S. this sector is sagging in Canada. In spite of the drop in raw material costs, finished product prices are dropping faster, noted one industry observer. Scott Paper Ltd. said competition is heating up in the Canadian tissue market. Its consumer tissue sales are up but commercial sales are down. Scott Paper currently has more than half the total tissue sales in the country, according to the *Globe and Mail*, but president and CEO Robert Stewart said industry capacity will be 30% greater by mid-year than it was back in 1989. He said that expansion is "well in excess of total market growth during the same period" and more typically would have occurred over five years than two.

The new projects include four in 1990—at Irving Tissue Ltd., Canadian Pacific Forest Products Ltd., Atlantic Packaging Products Ltd., and Cascades Inc. This year Cascades Industries' Cascades Inc. division plans to market a bath tissue made with recycled fiber.

Canadian Pacific Forest Products said in its annual report that its tissue business, Facelle Co. Ltd., faced "aggressive competitive activity, increased industry capacity, and new competition from recycled products" last year. Sales were off slightly, but earnings stayed level with 1989, helped by dropping pulp prices and cost reduction measures. Facelle is working to raise capacity of No. 4 paper machine at its Toronto, Ont., facility. Tissue shipments reached 68,000 metric tons last year.

Perkins Papers Ltd. expects midsummer 1991 startup of a new 48,500-short-tpy tissue machine at its Candiac, Que., mill; this will relieve it from buying paper from outside suppliers. The company makes bath tissue, toweling, and napkins for commercial and consumer markets, primarily from 100%-recycled paper. Consumers Paper Corp. has targeted a 1992 startup for a paper recycling and tissue mill in Redcliff, Alta., with capacity of 25,000 to 28,000 metric tpy. ■

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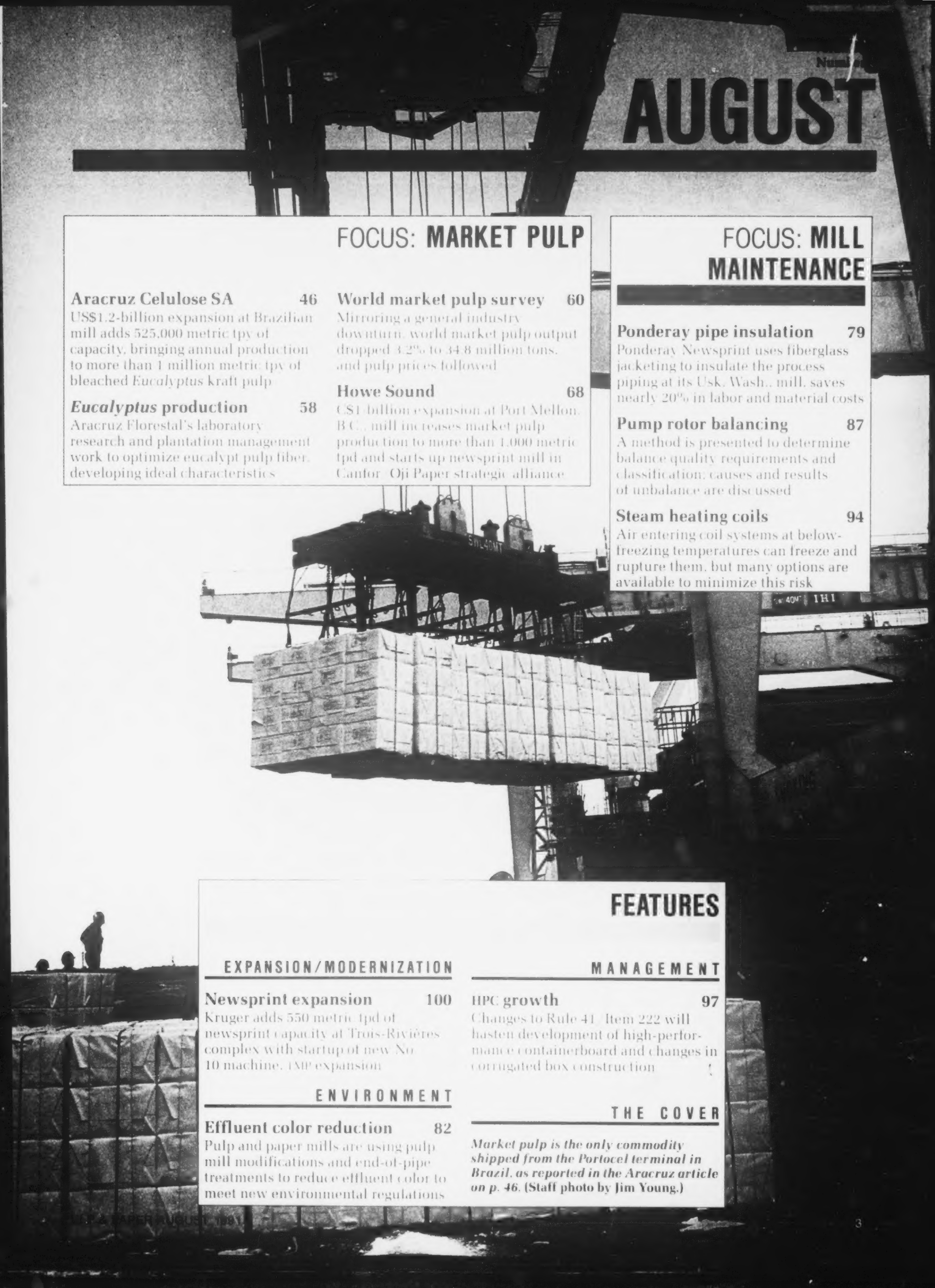

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***Market pulp is the only commodity shipped from the Portocel terminal in Brazil, as reported in the Aracruz article on p. 46.* (Staff photo by Jim Young.)**

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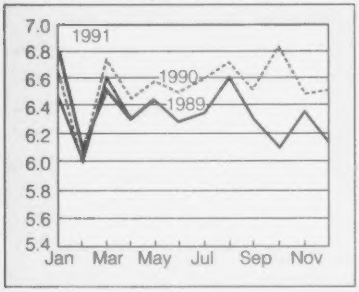
ABP

BPA

MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.4 million tons in May, according to the American Paper Institute, down 1.9% from the same month last year. The trend rate for paper stood at 38.2 million tpy through May, down 2.1% from last year, while the paperboard rate ended the month at 39.3 million tpy, up 0.5%. Month-to-month declines appear to have eased for the paper sector, API reported, but paperboard output declined fractionally from April.

Among major grades, printing and writing paper shipments were still off 4.9% through May, but API said that recent data show evidence of a turnaround. The major printing and writing grades gained ground in April and May, and unshipped orders turned upward after steep declines in the past two quarters. In paperboard, containerboard production for the domestic market was flat due to inventory drawdowns at box plants and mills. Box shipments were down 1.8%, according to the Fibre Box Assn.

Canadian newsprint shipments totaled 733,000 metric tons in April, down 10.0% from a year before, according to the Canadian Pulp & Paper Assn. (figures for May were not available at press time). Woodpulp shipments rose 6.0% to 657,000 tons. Operating rates stood at 88% for newsprint mills and 83% for pulp plants. ■

		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
***PAPER & PAPERBOARD PRODUCTION*[1]**					
Newsprint	May	574	5.3	6,770	4.8
Uncoated groundwood (s)	May	130	-5.8	1,643	-5.5
Coated paper (s)	May	565	-8.9	6,969	-5.3
Uncoated free-sheet (s)	May	949	-0.8	11,041	-4.6
Other printing/writing	May	126	0.8	1,531	-5.2
Total packaging and other paper (s)	May	363	-10.6	4,522	-1.7
Tissue	May	472	-4.5	5,758	0.6
Total paper	**May**	**3,179**	**-3.2**	**38,233**	**-2.1**
Unbleached kraft paperboard	May	1,660	-1.4	20,147	1.5
Semichemical medium	May	472	-5.4	5,653	-0.6
Bleached paperboard	May	393	6.8	4,596	1.8
Recycled paperboard	May	743	0.1	8,871	-1.7
Total paperboard	**May**	**3,269**	**-0.7**	**39,268**	**0.5**
Total U.S. paper and paperboard output	**May**	**6,448**	**-1.9**	**77,501**	**-0.8**
***PULP, WASTEPAPER & FIBER*[2]**					
Total U.S. woodpulp production	Apr.	5,285	0.6	63,649	1.8
Market pulp production	Apr.	783	16.2	9,140	6.5
Wastepaper consumption at paper/board mills	Apr.	1,740	0.1	21,125	3.3
Pulpwood consumption (cords)	Apr.	8,271	0.1	100,044	0.3
***CONVERTED PRODUCTS STATISTICS*[3]**					
Corrugated box shipments (billion ft²)	May	26.967	-2.3	131.097[6]	-1.8
Containerboard inventories at U.S. box plants and mills	May 1	2,883	11.2		
***INTERNATIONAL TRADE*[2]**					
U.S. paper imports (including products)	Apr.	997	-11.8	12,296	-7.4
Imports of Canadian newsprint	Apr.	621	-14.1	7,730[6]	-8.9
U.S. paper exports (including products)	Apr.	683	11.1	8,085	17.5
Exports of unbleached kraft linerboard	Apr.	236	-7.8	3,051	13.7
Exports of woodpulp	Apr.	528	-1.9	6,268	7.4
Norscan pulp inventories[4]	May 31	1,583	9.8		
Norscan pulp operating rates[4]	May	85%	84%	88%	89%
CANADIAN STATISTICS*[5] *(reported in metric tons)					
Total newsprint shipments	Apr.	733	-10.0	2,944[6]	-4.2
Operating rates	Apr.	88%	93%	92%	94%
Inventories held by U.S. consumers	Apr. 30	1,425	11.9		
Other paper/board shipments	Apr.	588	-3.3	2,340	-3.8
Woodpulp shipments (export only)	Apr.	657	6.0	2,758	8.5
Operating rates	Apr.	83%	83%	90%	90%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Corrugating medium: Pickup in demand, slow capacity growth set stage for market recovery

Grade structure: Corrugating medium, the middle fluting material used in corrugated containers, is made from both semichemical pulp and recycled fiber. Semichemical medium may not contain less than 75% virgin woodpulp (mainly semichemical). The share of total medium capacity held by semichemical has declined to about 71% from 79% in 1980, while recycled has grown to 29%.

Basis weights for corrugating medium are 22, 26, 33, 36, and 40 lb/1,000 ft². Standard sheet weight is 26 lb, which accounts for about 77% of production (although heavier weights have been growing in popularity).

Production/capacity: The corrugating medium market has been in a slump for more than two years due to sluggish demand and rapid capacity growth for recycled medium. Prices have been declining for more than two years, hurting profitability and resulting in the closure of some mills and delay of some expansion projects. With almost no future capacity growth planned, the stage should be set for a market recovery when the economy picks up.

In the mean time, the recession has been taking its toll on U.S. corrugated box shipments, which rose a mere 0.8% in 1990 and are projected to decline about 0.5% this year. Corrugating medium production registered a healthy gain of 2.9% in 1990 to a record 7.7 million tons. Semichemical production last year was practically flat at 5.7 million tons. Recycled medium output took a jump of 11% to 2.0 million tons, reflecting new capacity additions.

Corrugating medium production in 1991 is expected to decline 0.8% due to the lower corrugated box cutup. Semichemical medium output held up well through May but is expected to be down 1.1% for all of 1991, partly due to downtime at several mills for machine rebuilds and conversion of one machine to recycled linerboard. Operating rates for semichemical mills will remain near full capacity at about 97%. Recycled medium production is expected to remain flat, but this would cause operating rates to decline to about 85% because of further capacity growth.

Outlook: Corrugated box shipments are expected to begin recovering in second-half 1991 with a gradual pickup in the economy. The improvement is expected to continue in 1992, with box shipments for the year rising about 4% (based on projected real GNP growth of 3.4%). Corrugating medium production is expected to rebound 4.3% next year, with the strongest improvement in recycled medium. Semichemical medium mills are expected to continue running near capacity, while operating rates for recycled mills move up to roughly 90%.

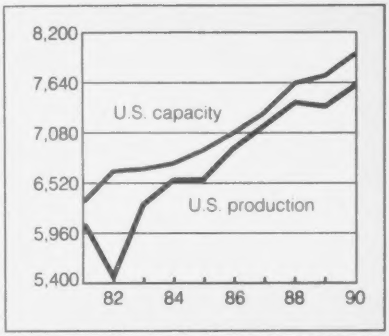
The improvement in operating rates is helped by a lack of new capacity additions. Semichemical medium capacity is expected to rise 2.9% in 1992 after declining 0.6% in 1991, according to the American Paper Institute's 1990 capacity survey. These figures include the shutdown of a 100,000-tpy semichemical mill at Harriman, Tenn., in early 1990 but may not include Green Bay Packaging Inc.'s conversion of a 170,000-tpy machine to recycled linerboard in early 1991. Recycled medium capacity is expected to rise 1.7% in 1992 after increasing 4.5% in 1991 (and a sizzling 9%/year over the 1987-90 period).

Some semichemical machine rebuild projects are under way at Willamette Industries Inc., Menasha Corp., and Weston Paper & Manufacturing Co. Beyond these projects, virtually no new capacity additions have been scheduled for the 1992-94 period.

Prices: After reaching close to $400/short ton in second-quarter 1988, prices for semichemical medium have been steadily eroding. By this spring the list price for 26-lb semichemical medium had dropped to $300, and transaction prices in the East by early summer were down to $280 to $290.

With signs that the market may be turning, producers began to announce a new list price of $330 for semichemical medium and $320 for recycled in the East, effective Aug. 1. Year-end transaction prices for 26-lb semichemical in the East are as follows: 1985, $240; 1986, $290-300; 1987, $350-360; 1988, $380-390; 1989, $360-370; 1990, $300-320. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

U.S.	1990	1991e	1992e
Production			
Semichemical	5,710	5,640	5,820
Recycled	1,985	1,990	2,140
Total	7,695	7,630	7,960
Capacity			
Semichemical	5,845	5,810	5,980
Recycled	2,230	2,330	2,370
Total	8,075	8,140	8,350
Utilization rates			
Semichemical	97.7	97.2	98.0
Recycled	89.0	85.2	90.3
Imports	140	130	135
Exports	145	165	150
Apparent U.S. consumption	7,690	7,593	7,945
lb/capita	60.94	55.68	61.92
GNP ratio	1.84	1.82	1.85

1. American Paper Institute capacity survey (1990).
2. 1,000 tons/$ billion real GNP.
e = *Pulp & Paper* estimate.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity			
	Semi-chem	Recycled medium	Total	Market share (%)
1. Stone	685	235	920	11.3%
2. G-P	825	—	820	10.1
3. PCA	735	70	800	9.8
4. Weyco	675	—	675	8.3
5. Inland	240	360	600	7.3
6. Smurfit	115	390	505	6.2
7. Mead	380	—	380	4.7
8. IP	375	—	375	4.6
9. Willamette	165	180	345	4.2
10. Va. Fibre	270	—	270	3.3

Market share of top five companies:
46.9%
Market share of top ten companies:
69.9%
Total U.S. capacity (1991):
8,140

1. Includes G-P's 50% interest in a 170,000-tpy machine at Sonoco Products Co.'s Hartsville, S.C., mill.

Finland port strike disrupts paper mills

About a dozen Finnish paper and pulp mills took downtime and idled workers when a strike by more than 25,000 transportation workers in June blocked overseas shipments and virtually isolated the country from the rest of Europe. Over 3,500 Finnish dock workers returned to their jobs late in the month ending a three-week strike that had closed most of the country's ports and halted bus and truck traffic. Port workers on June 27 accepted a 4% wage increase for 1991, following ratification of a 3.8% wage hike by 20,000 bus and truck drivers. The transport workers' union called for a strike June 2 to push for a 6.1% wage hike, with employers later locking out workers in the transportation sector.

The strike blocked 80% of the country's total exports and imports. The country's vast pulp and paper industry was hardest hit, with at least ten mills shutting down because of a lack of storage space. Thousands of pulp and paper industry workers were idled. Although the strike reduced forest products shipments by 95%, it did not last long enough to have a major effect on deliveries, observers said. Finland exported 6.1 million tons of paper and 1.6 million tons of board in 1990, and the pulp and paper industry was reported to have suffered profit losses of FM100 million ($24 million) during the 24-day strike. The country's reputation as a reliable forest products supplier was also damaged in the strike, with many customers temporarily switching to others sources. ■

Earnings drop in Japanese paper industry

Profits in the Japanese paper industry plunged in the fiscal year ending Mar. 31 as sales growth ebbed and depreciation costs rose. Amid asset sales and heavy interest payments, major producers, such as Oji Paper Co. Ltd., Jujo Paper Co. Ltd., Sanyo-Kokusaku Pulp Co. Ltd., and Daio Paper Corp., posted pretax profit declines of 35% or more, with Daishowa Paper Manufacturing Corp. Ltd. showing a loss of ¥14.9 million (*P&P*, July 1991, p. 41). The company made a ¥6.9-million profit by selling off land and other assets just to pay dividends. Honshu Paper Co. Ltd.'s pretax earnings dipped 7.0% in 1990, while Rengo Co. Ltd. was the largest Japanese paper company to post profit growth, with a 5.1% increase to ¥7.5 million.

Oji Paper, Japan's largest paper manufacturer, suffered a 37% decline in profit to ¥25.8 billion. The company said it expects to post a 22.7% drop in pretax profits for fiscal 1991 as continued high depreciation costs and rising distribution and material expenses erode its performance. ■

Fiscal 1990 Japanese paper company profits (million ¥).[1]

Company	Gross sales	% change 1990/89	Ordinary income[2]	% change 1990/89
Oji Paper Co. Ltd.	¥482,000	2.8%	¥25,891	–36.7%
Honshu Paper Co. Ltd.	413,000	6.1	5,939	–7.0
Jujo Paper Co. Ltd.	402,900	2.4	13,313	–37.1
Daishowa Paper Manufacturing Co. Ltd.	353,600	0.2	(14,900)	NM
Sanyo-Kokusaku Pulp Co. Ltd.	317,700	0.2	8,177	–50.6
Daio Paper Corp.	275,400	8.9	4,399	–39.3
Rengo Co. Ltd.	235,200	5.7	7,520	5.1
Mitsubishi Paper Mills Ltd.	203,300	1.0	6,690	–58.8
Kanzaki Paper Manufacturing Co. Ltd.	157,500	0.8	4,809	–29.3
Hokuetsu Paper Mills Ltd.	106,200	3.3	5,319	–37.7
Settsu Co. Ltd.	69,000	10.9	98	–99.0

1. Fiscal year ending Mar. 31, 1991.
2. Pretax profit, before extraordinary items.
Source: *PPI This Week*.

Manville to acquire Jorba and Syspack

Riverwood International Corp., formerly Manville Forest Products Corp., agreed in June to acquire the paperboard packaging and packaging machinery manufacturing businesses of Jorba SA and Syspack SA located in Barcelona, Spain. The transaction was to be completed in July. The combined Jorba and Syspack businesses had sales of over $30 million in 1990 and employ around 200 people. Jorba is a leading supplier of beverage carriers to the beer and soft drink industry.

"The acquisition of Jorba is another important step in our strategy to expand in Europe, adding to our strong position in the U.K., Sweden, and Germany. It will provide us with additional converting capacity to service the growing European beverage market," said the company. Last year, Riverwood acquired DRG Cartons, the third-largest producer of folding cartons in the U.K., and Fiskeby Board AB of Sweden, a leading European producer/converter of recycled cartonboard. ■

Smurfit buys Papelera Atlas in Mexico

Ireland's Jefferson Smurfit Group in June acquired a 24,000-metric-tpy recycled paper/board mill in Mexico City, Mexico, and a 12,000-metric-tpy corrugated plant located outside the capital from the privately owned company Papelera Atlas SA. The mill's output is about one-third printing/writing grades and about two-thirds corrugating medium and test liner, which are produced on a 2.6-m-wide fourdrinier machine and a 2.0-m-wide cylinder machine. Smurfit also purchased a corrugated plant in Monterrey, Mexico, from Fabrica de Papel Monterrey.

Smurfit will operate the Atlas mill and the two corrugated plants through its Carton y Papel de Mexico paper and packaging subsidiary. The Mexican operations currently comprise two recycled paperboard mills in Cerro Gordo and Los Reyes, five corrugated container plants, the largest folding carton plant in Latin America, one composite can plant, and one plastic bottle plant. The mills, which use primarily recycled wastepaper, produce about 240,000 metric tpy of containerboard and boxboard. ■

Market Pulp Prices, Production Drop as Producers Hope to Hit Bottom Soon

Output declines 3.2% in 1990, and prices plunge more than 30%, but some pulps, such as hardwood grades, continue to make capacity gains

By KELLY H. FERGUSON, Projects Editor

The pulp and paper industry downturn, which began in mid-1990, took its toll on market pulp as prices plunged and world production declined. Total market output was down 3.2% to 34.8 million tons from 1989 levels, based on *Pulp & Paper International*'s 1990 Market Pulp Survey. Although capacity increased for most major grades, due to projects begun two to three years ago coming online, production of those same grades was scaled back significantly in 1990.

The geographic breakdown of market pulp production remains unchanged, as North America continues to dominate, producing 47% of the world's total market pulp (Figure 1). That domination will most likely continue, as Canada plans to bring on 622,000 tons of capacity in the next three years and the U.S. expands by 142,000 tons in that same period.

However, capacity increases in other regions could have a major impact on the overall market. In the next three years, significant tonnages will be added by Brazil (550,000 tons), Japan (250,000 tons), Rep. Korea (200,000 tons), Spain (110,000 tons), Portugal (100,000 tons), and Thailand (100,000).

The export picture remains basically unchanged, with Canada as the leading exporter of market pulp (Table 2). However, comparing 1989 export figures with

TABLE 1: **1990 market pulp output for selected countries (000 metric tons).**

	Sulfate	Sulfite	Mechanical	Semi-chemical	Non-wood	Recycled	Total
Canada	6,346	552	1,137	—	—	70	8,105
U.S.	7,167	1,110	6	—	161	47	8,491
Sweden	2,731	361	547	—	—	—	3,639
Finland	1,482	243	60	—	—	60	1,845
Norway	270	227	248	32	—	—	777
Brazil	1,571	25	10	83	—	—	1,689
Japan	775	187	—	40	—	—	1,002
Portugal	1,093	118	—	—	—	—	1,211
France	625	245	3	—	—	—	873
Spain	572	36	23	—	5	—	636
New Zealand	276	—	120	—	—	—	396
Chile	552	—	—	—	—	—	552
Total	**23,460**	**3,104**	**2,154**	**155**	**166**	**177**	**29,216**
Total world	**26,991**	**4,491**	**2,315**	**338**	**495**	**204**	**34,834**

Note: Dissolving included in sulfate and sulfite. Fluff included in sulfate, sulfite, and CTMP. Recycled is mainly deinked grades.

Note: All figures in this article are in metric tons. Pulp & Paper International's *1990 Market Pulp Survey, a summary of which is published here, is an 80-page mill-by-mill listing of nearly 300 market pulp producers worldwide, covering production, capacity, export percentage, and brand names used. This survey is priced at $577 and is available from* Pulp & Paper International *in Brussels, Belgium. Telephone: (32-2) 537-5626. Telex: 24672 mfp b.*

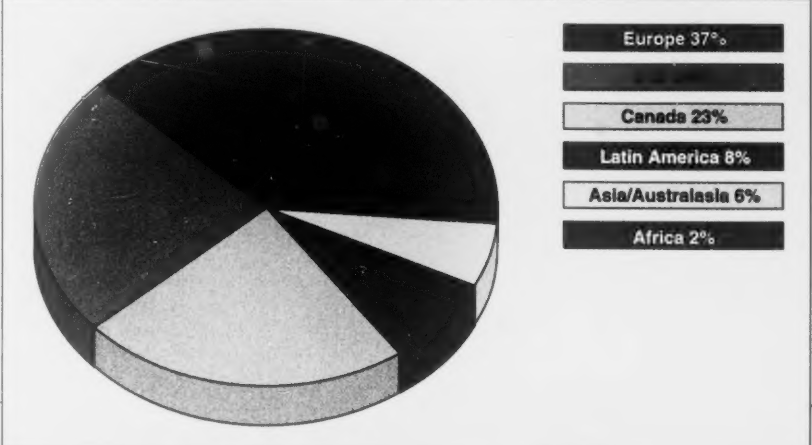


FIGURE 1: **Geographic distribution of world market pulp production, 1990.**

those in 1990, most of the major exporters cut back somewhat. Canada and Sweden decreased exports by 200,000 tons each from 1989 levels. The U.S., though, increased its exports by 200,000 tons.

Europe is the leader in importing market pulp at 9.3 million tons, followed by Asia/Australasia (almost 5 million tons) and the U.S. (4 million tons). However, both Asia/Australasia and the U.S. decreased their imports of pulp in 1990 (the U.S. decreased imports by more than 300,000 tons). Over the same period, Europe increased its market pulp imports by more than 300,000 tons.

TABLE 2: **1990 market pulp exports from major producers (000 metric tons).**

Major importers	U.S.	Canada	Sweden	Finland	Norway	Brazil	Total
Europe	1,918	2,441	2,603	1,436	607	543	[illegible]
U.S.	—	3,675	37	14	—	275	[illegible]
Canada	157	—	1	—	—	8	[illegible]
Asia/Australasia	2,317	2,024	230	169	19	240	[illegible]
Latin America	335	105	2	1	—	23	[illegible]
Africa	89	3	40	13	8	—	[illegible]
World total	**4,816**	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

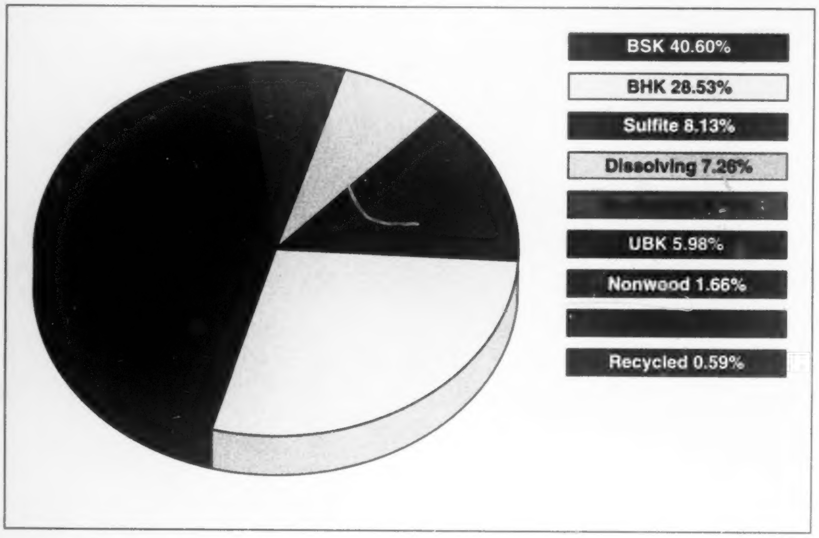
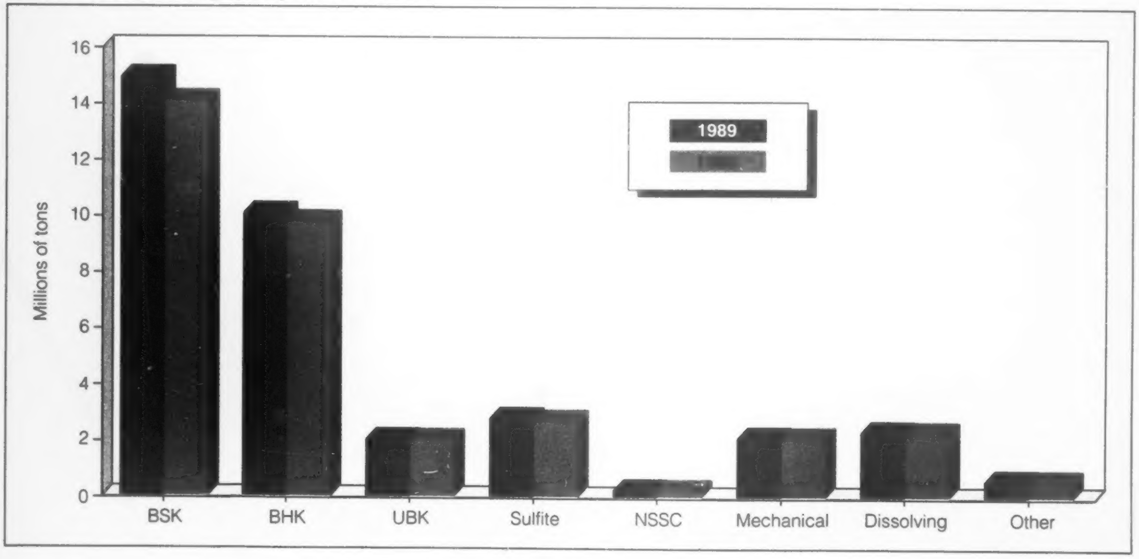


FIGURE 2: **Grade distribution of world market pulp production, 1990.**

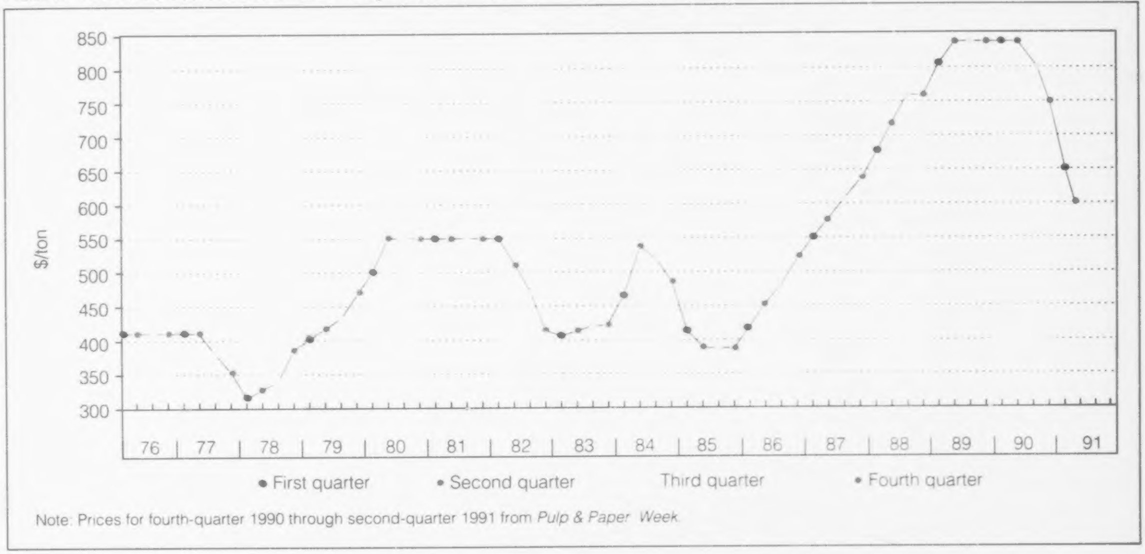
FIGURE 3: **World market pulp output, 1989 vs 1990.**



Behind the U.S., Japan is the single largest importer of market pulp (2.8 million tons), with most coming from Canada (1.27 million tons) and the U.S. (1.21 million tons). Fed. Rep. of Germany was at one time close to Japan as a major importer of pulp, but, now that the two republics have been united, there is no clear indication of how dominant Germany will be in importing pulp.

HARDWOOD GRADES COME ON STRONG. Bleached softwood kraft (BSK) continues to be the major market

FIGURE 4: **Northern bleached softwood kraft price, 1976-91, $/ton in Northern Europe.**



Note: Prices for fourth-quarter 1990 through second-quarter 1991 from *Pulp & Paper Week*.

Market pulp prices near the bottom, but harder to see the next recovery

Market pulp prices, which have been in free-fall since early last year, finally appear to be near the bottom. But when the next recovery will begin is far less certain. Production of printing/writing papers should begin to improve in the second half of this year. But any recovery in market pulp prices will take longer because of substantial new capacity additions coming onstream and increasing use of deinked wastepaper pulp.

Sensing that prices had peaked and plenty of pulp was available, pulp consumers began to reduce their inventories in 1989. The reduced demand and rising mill inventories caused prices to begin sliding, starting with southern pine and mixed hardwood. Prices for the southern grades plunged rapidly through the first five months of 1990, creating a large price gap with northern softwood and hardwood.

Rather than reduce prices, Canadian and Nordic producers took extensive production curtailments but lost significant market share to cheaper southern pulps. This was particularly apparent in such markets as Japan, where the more than $150/ton price gap between northern and southern softwood caused buyers to shift heavily to the latter grade. For all of 1990, Canadian chemical paper-grade pulp shipments were down 13%, while U.S. shipments were up 3%.

PRICES IN RETREAT. Canadian producers began to lower the flag in July 1990, when the price of northern bleached softwood kraft (NBSK) was reduced to $800/ton from the domestic list price of $830, which had been in effect since second-quarter 1989. Since then, northern softwood prices have come down rapidly as Canadian producers have tried to reduce swollen inventories, win back market share, and keep cash flowing. By early summer, the price of NBSK had dropped to a list price of $575 in the U.S. market with somewhat lower transaction prices reported. Canadian shipments through May were up 6%—but profits have just about disappeared.

Hardwood pulp has been in tighter supply, and some stabilizing of prices in late spring gave hope that the market might be forming a bottom. However, the tightness in hardwood has probably been due to the unusually large price gap with softwood, which caused some southern U.S. mills to produce more hardwood. Another factor has been wet weather in parts of the South, which has made it difficult to harvest hardwood.

With the price of softwood coming down, industry observers expect more hardwood to be produced. In addition, greater amounts of hardwood will also be coming on the market from such new mills as Daishowa Canada Inc.'s 340,000-metric-tpy mill at Peace River, Alta., which started up last year, and two new eucalyptus mills that began running earlier this year in Latin America—the 525,000-metric-tpy Aracruz Celulose SA mill and the 325,000-metric-tpy Celulosa de Santa Fe SA mill in Chile. All this could place more pressure on hardwood pulp prices, and the floor could become a trapdoor.

pulp grade, accounting for a little more than 40% of total market pulp production (Figure 2). But, as in the 1989 survey, bleached hardwood kraft (BHK) is expected to continue significant capacity gains. BHK already accounts for almost 30% of market pulp output.

Figure 3 shows the continuing trend of the last four or five years. BSK production has continued to decline since 1987, with a 4.9% decline from 1989 to 1990. BHK, on the other hand, has slowly increased since 1987, with only a 2.2% decline in production in 1990 due to general market sluggishness.

Also, BHK capacity for the next three years is expected to increase by more than 1.4 million tons, while BSK will increase by 840,000 tons. Another hardwood pulp, unbleached hardwood kraft, experienced a 27.9% increase in production from 1989 to 1990.

Sulfite pulps seemed to have gained popularity in some regions, accounting for 8.13% of total market pulp output in 1990, up from 7.64% in 1989. For example, almost 100,000 tons of sulfite pulp came online in the U.S. from 1989 to 1990. Europe continues to be the leader in sulfite production, with 1.9 million tons (Table 3).

Mechanical pulps, mainly chemi-thermomechanical pulp (CTMP) from North America, performed reasonably well in 1990. And 120,000 tons of CTMP capacity is expected within the next three years. CTMP production increased 3.9% to 1.38 million tons in 1990, and capacity increased 9.8% to 1.88 million tons.

As for market pulp prices, Figure 4 basically mirrors the industry's downturn. Prices for northern bleached softwood kraft (NBSK) in Northern Europe (US$/ton) plateaued at $840 for about five quarters in 1989 and 1990 before beginning a quick plunge in mid-1990. According to *Pulp & Paper Week*, the price is still unsteady at about $550/ton, but most producers are expecting the market to bottom out in the near future and are predicting an upturn within two years (see sidebar). ■

TABLE 3: **1990 market pulp output by grade and continent (000 metric tons).**

Grade	Europe	North America	Latin America	Asia/ Australasia	Africa	Total
BSK[1]	4,051	8,995	765	238	75	14,124
BHK[1]	4,061	3,284	1,431	978	171	9,925
UBK	587	579	361	406	146	2,079
Sulfite[2]	1,972	806	23	26	—	2,827
Dissolving	425	1,511	22	350	219	2,527
Semichemical	215	—	—	40	—	255
SGW	472	71	—	—	—	543
RMP/CMP/TMP	140	235	—	10	—	385
CTMP	380	837	60	110	—	1,387
Nonwood	94	161	108	162	53	578
Recycled[3]	87	117	—	—	—	204
World total	**12,484**	**16,596**	**2,770**	**2,320**	**644**	**34,834**

BSK=Bleached softwood kraft (sulfate). BHK=Bleached hardwood kraft (sulfate). UBK=Unbleached kraft (sulfate). SGW=Stone groundwood. RMP=Refiner-mechanical pulp. CMP=Chemimechanical pulp. TMP=Thermomechanical pulp. CTMP=Chemi-thermomechanical pulp.

[1] Bleached and semibleached. [2] Bleached and unbleached. [3] Mainly deinked grades. Note: Fluff included in sulfate, sulfite, and CTMP.

SCRAPING THE BOTTOM. Prices, however, are not expected to fall much further since current levels are near or below the break-even level of many Canadian and Nordic producers. With pulp no longer profitable to produce, these mills should begin to take heavy downtime in the second half of this year, which should help rebalance supply with demand. This rebalancing could be achieved even more rapidly if current labor negotiations break down in British Columbia, which accounts for about 13% to 14% of the world chemical paper-grade market pulp supply.

Printing/writing paper production should begin to pick up late this year, and this should help market pulp demand. But startup of such new market pulp capacity additions as Union Camp Corp. at Eastover, S.C. (initially about 150,000 tpy), Stone Savannah River Corp. at Port Wentworth, Ga. (350,000 tpy), and Alabama Pine Pulp Co. at Claiborne, Ala. (425,000 tpy), later this year will keep the pressure on the market. In addition, three new chemi-thermomechanical pulp mills have started up in Canada since last fall: Donohue-Matane Inc., Slave Lake Pulp Corp., and Louisiana-Pacific Corp.

Market pulp is also facing increasing competition from wastepaper fiber. This will be coming from a number of new deinked market pulp mills being proposed or built by mostly new entrepreneurs. Fox River Fiber Corp., for example, was scheduled to start up a new 70,0000-tpy deinking mill in Kaukauna, Wis., and at least a half dozen other projects have been announced. In addition, some paper mills are adding their own deinking lines, and this is already reducing their outside market pulp purchases. One West Coast market pulp mill is now looking for new specialty niches after losing some of their newsprint mill customers who reduced their outside pulp purchases after adding deinking lines.

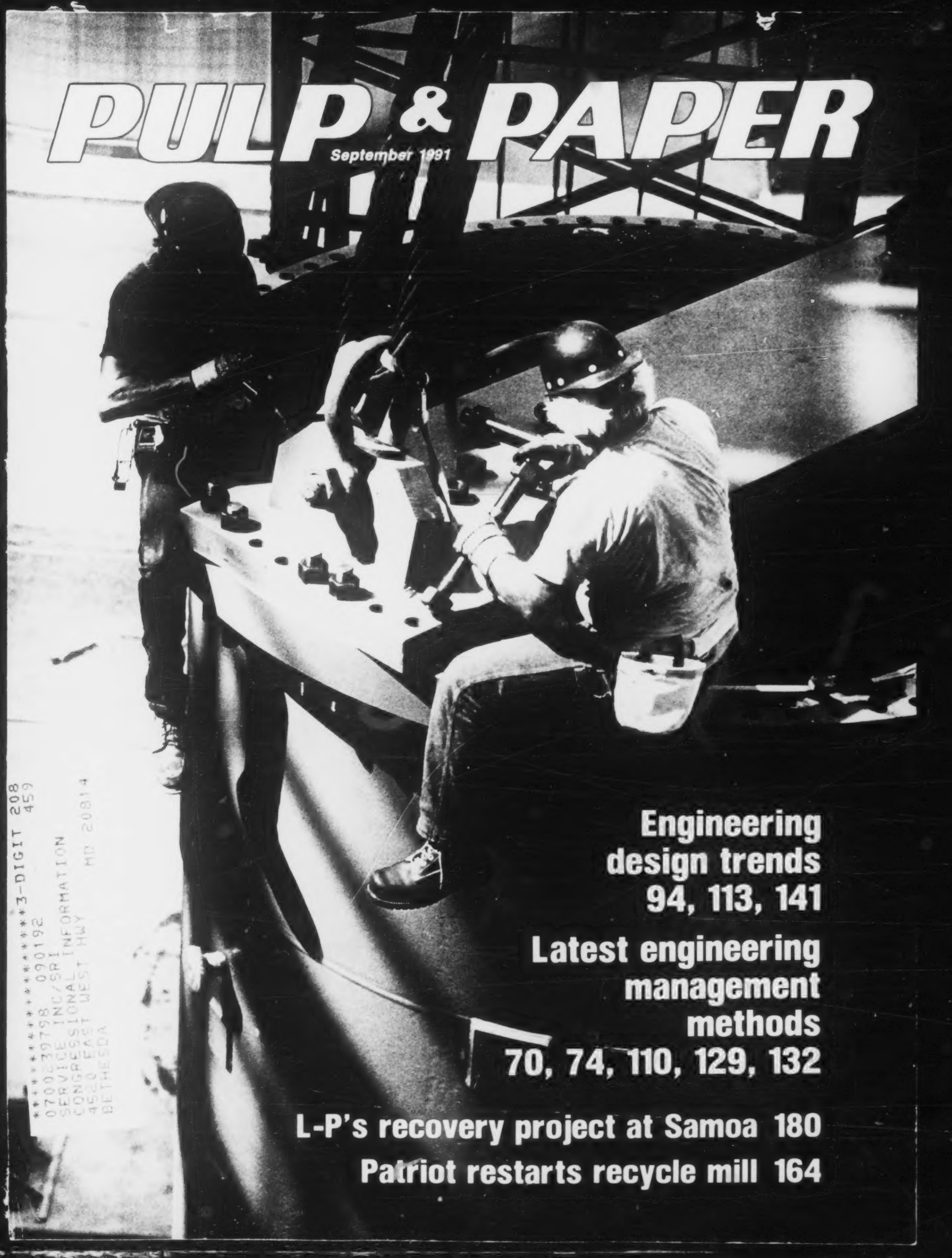
LOOKING FOR THE NEXT RECOVERY. Nevertheless, the next recovery in market pulp will probably come before anyone expects. Demand will continue to grow, particularly from the rapidly expanding economies of Asia. A number of proposed new market pulp projects have been canceled or indefinitely postponed. Some older mills will probably shut down rather than make costly modifications to meet new environmental requirements. Suddenly, buyers will decide it is time to build inventories—and the next recovery in the market will be underway. Although the recovery may start in 1992, it will not get into full swing until 1993, Canfor Corp. chairman and CEO told a recent investment conference sponsored by Goepel Shields & Partners Inc. in Vancouver, B.C.

(*Pulp & Paper* and *Pulp & Paper Week* will be holding a conference on Market Pulp: Looking for the Next Recovery, Oct. 26-27, at Le Meridien Hotel in Montreal, Que.).

Will Mies
Executive News Editor

PULP & PAPER

September 1991



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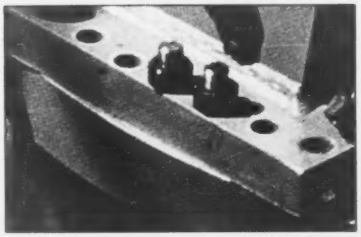
This issue focuses on the latest engineering design approaches for such process areas as stock preparation, brownstock washing, and oxygen supply. It also discusses techniques for improving engineering effectiveness, such as automation of engineering, procurement, and construction (EPC) projects. The cover photo was taken during the installation of a pressure diffuser at Leaf River Forest Products in New Augusta, Miss., (div. of Georgia-Pacific), part of an EPC project by Kamtech. The unit, started up November 1990, is a 1,430-a.d.-tpd Kamyr pressure diffuser, following the existing Kamyr digester, washing both hardwood and softwood pulps. (Photo by Tom Grow, courtesy of Kamyr Inc.)



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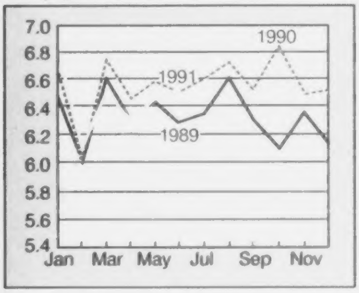
MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.5 million tons in June, unchanged from a year earlier, according to the American Paper Institute. The trend of production turned upward during the second quarter, raising the seasonally adjusted rate of production to 77.6 million tpy, up 3.6% from the March 1991 low and within 0.5% of last year's record total of 78.7 million tons. The biggest gains were in the paper grades, up 4.6% since March. The seasonally adjusted rate for paper during the first half was 38.4 million tpy, still down 1.6% from the year-ago period, while the rate for paperboard stood at 39.3 million tpy, up 0.6%.

Among major grades, containerboard output was up 1.0% thanks to a 12.8% increase in production for export. Newsprint production is up, but shipments from North American mills were off 7.1% in the first half due to continuing weakness in advertising markets. Printing and writing shipments were off 3.9% from last year, but the uncoated grades were trending upward in May and June.

Canadian newsprint shipments totaled 719,000 metric tons in June, down 10.6% from June 1990. Newsprint mills operated at 85% capacity, down from 89% last year. Woodpulp shipments climbed 10.1% to 717,000 tons, as operating rates rose from 84% last year to 89%. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	June	559	3.7	6,760	4.6
Uncoated groundwood (s)	June	142	0.0	1,685	-2.7
Coated paper (s)	June	594	73.2	7,022	-4.6
Uncoated free-sheet (s)	June	919	1.7	11,042	-3.5
Other printing/writing	June	117	-4.1	1,511	-6.6
Total packaging and other paper (s)	June	367	-6.9	4,473	-2.1
Tissue	June	474	-1.0	5,746	0.3
Total paper	**June**	**3,172**	**-0.6**	**38,238**	**-1.7**
Unbleached kraft paperboard	June	1,672	-0.5	20,140	1.2
Semichemical medium	June	467	0.0	5,644	-0.5
Bleached paperboard	June	381	1.3	4,592	1.6
Recycled paperboard	June	763	3.4	8,914	-1.3
Total paperboard	**June**	**3,282**	**0.6**	**39,291**	**0.4**
Total U.S. paper and paperboard output	**June**	**6,454**	**0.0**	**77,529**	**-0.6**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	May	5,162	0.1	63,307	1.6
Market pulp production	May	708	1.4	9,011	5.5
Wastepaper consumption at paper/board mills	May	1,763	-2.1	21,161	2.6
Pulpwood consumption (cords)	May	8,108	-0.1	99,494	0.2
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	June	25.739	-2.9	156.832[6]	-2.0
Containerboard inventories at U.S. box plants and mills	May 1	2,883	11.2		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	May	1,008	-8.4	12,256	-7.6
Imports of Canadian newsprint	May	646	-9.9	7,740[6]	-9.0
U.S. paper exports (including products)	May	698	27.6	8,143	19.5
Exports of unbleached kraft linerboard	May	260	28.7	3,066	16.5
Exports of woodpulp	May	576	30.0	6,396	11.5
Norscan pulp inventories[4]	June 30	1,611	15.3		
Norscan pulp operating rates[4]	June	86 %	85 %	84 %	89 %
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	June	719	-10.6	4,370[6]	-7.8
Operating rates	June	85 %	89 %	89 %	95 %
Inventories held by U.S. consumers	June 30	1,410	7.1		
Other paper/board shipments	June	612	-1.3	3,576	-3.2
Woodpulp shipments (export only)	June	717	10.1	4,168	9.5
Operating rates	June	89 %	84 %	89 %	89 %

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Uncoated groundwood: Grade's movements reflect nature of marketplace extremes

Grade structure: In recent years the dividing line between newsprint and low-end uncoated groundwood paper has become increasingly fuzzy because of their similar physical properties. This is particularly true of rotogravure newsprint (rotonews), which is being replaced on the low end by high-brightness newsprint and from above by machine-finished and supercalendered (SC) grades.

The distinction is that uncoated groundwood paper has a higher brightness level and smoother surface than newsprint. Supercalendering adds gloss to compete with lightweight coated (LWC) groundwood paper. Brightness levels range from 64 to 74 Elrepho, compared with 56 to 62 for standard newsprint and 68 to 84 for LWC. Basis weights range from 20 to 45 lb/3,300ft². Primary uses for uncoated groundwood paper include preprinted newspaper inserts and direct mail flyers, catalogs, lower-cost business forms, Sunday newspaper magazines, and telephone directories.

Production/capacity: The advancing age of many newsprint machines has prompted some papermakers to convert those machines to uncoated (or coated) groundwood, a higher-value grade. In addition, some companies have built new machines, primarily for SC paper. This has helped push North American production to higher levels. U.S. mills shipped 1.768 million tons of uncoated groundwood papers in 1990, up 1.1% from 1989, which was itself 8% higher than 1988. The small growth in 1990 was due in large part to the economic recession, which caused a drop in advertising, and the postal rate increase, which saw catalogers cut the number of issues, size of press runs, and catalogs' physical sizes to save money. Because of Canada's ranking position in newsprint, that country also led in uncoated groundwood paper, but the U.S. is closing the gap.

Canadian uncoated groundwood shipments advanced just under 6.0% in 1990 from 1989, to reach 2.076 million short tons.

Canadian uncoated groundwood capacity increased 11.6% (to 2.312 million short tpy) in 1990, following a 14.3% increase in 1989. Capacity is projected to rise another 6.9% in 1991, largely due to a new machine online at Stone-Consolidated Inc.'s Grand'Mère mill. U.S. capacity rose 2.7% in 1990 to 1.924 million tpy and is expected to drop by 4,000 tons in 1990.

No significant expansion has been planned in the next few years. Daishowa America Co. Ltd. has delayed a new 150,000-tpy directory paper machine in Port Angeles, Wash., but is putting in deinking facilities to make recycled-content paper. Lake Superior Paper Industries is studying a second 220,000-tpy machine. Cascades Inc. may build a 210,000-short-tpy machine at Port Cartier, Que., and Madison Paper Industries postponed a 170,000-tpy expansion of SC paper at its Madison, Maine, mill.

Outlook: Consumption of uncoated groundwood paper in the U.S. is estimated to rise 3.4%/year through 2000. European mills continue to add capacity, possibly indicating additional growth in U.S. market share.

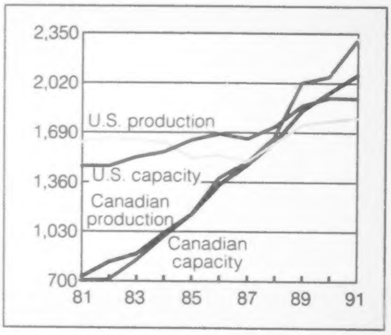
Supercalendered paper demand is expected to grow at 6.7%/year through 2000, compared with 1.0% for directory paper, a loss of 4.5%/year for forms, and 1.2% growth for other groundwood grades.

Prices: Price increases announced in 1990 fell victim to the declining economy and the Gulf War, even though demand for premium SC stayed relatively strong.

Prices (year-end, except 1991) for 34-lb premium supercalendered ($/short ton) are as follows: 1988, $830; 1989, $830; 1990, $830; mid-year 1991, $830 (selling at $800).

Prices for 35-lb offset, 65 brightness are as follows: 1988, $675; 1989, $655; mid-year 1991, $655 (selling at $600). For 15-lb, 65-brightness forms prices were as follows: 1988, $720; 1989, $700; mid-year 1991, $560.

SUPPLY/DEMAND (000 tons)



FORECAST (000 short tons)

U.S.	**1991e**	**1990r**	**1989r**
Production	1,788	1,768	1,743
Capacity[1]	1,920	1,924	1,874
Utilization rate	93.1%	91.9%	93.0%
Imports	2,439	1,338	1,304
Exports	87	75	88
Apparent U.S. consumption			
000 tons	4,140	3,031	2,959
lb/capita	32.95	24.37	24.04
000 tons/$ billion real GNP (1982)	0.98	0.73	0.72
Canada[2]			
Production	2,076	1,959	1,840
Capacity	2,312	2,072	2,032
Exports	1,729	1,695	1,527
Utilization rate	89.8%	94.5%	90.6%

e = *Pulp & Paper* estimate. r = Revised.

[1] American Paper Institute.

[2] Canadian Pulp & Paper Assn.

TOP NORTH AMERICAN PRODUCERS

	Annual capacity[1]	**Market share**
1. Stone-Consolidated	490	11.6%
2. MacMillan Bloedel	460	10.9%
3. Abitibi-Price	440	10.4%
4. Canadian Pacific Forest Products	420	9.9%
5. Champion International	355	8.4%
6. Georgia-Pacific	270	6.4%
7. St. Marys Paper	270	6.4%
8. Boise Cascade	265	6.3%
9. Lake Superior Paper	240	5.7%
10. Kruger	237	5.6%

Market share of top five companies:
51.2%

Market share of top ten companies:
81.51%

North American capacity (1991):
4,232 million tons
U.S.: 1, 920; Canada: 2,312

[1] Figures are in 000 short tons.

SALES AND EARNINGS

U.S. paper industry profits halved again

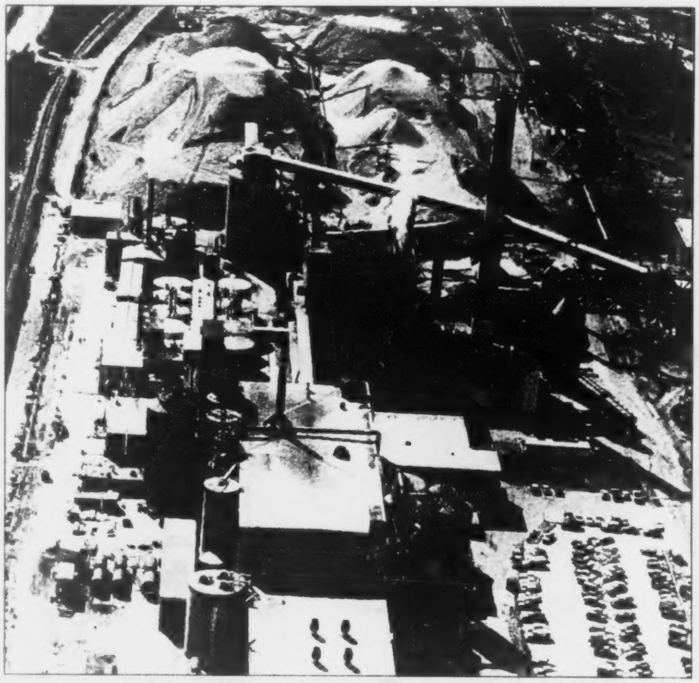
Given the current recession, it comes as no surprise that a *Pulp & Paper Week* survey of 31 U.S. forest products manufacturers shows a 53.1% decline in earnings to $600.6 million in the second quarter ending June 30, 1991, compared with the same period in 1990. Total sales revenue was off 5.7% to $23.3 billion. Among the major companies, Boise Cascade Corp. suffered the heaviest loss, with net income from operations at Stone Container Corp., Champion International Corp., Georgia-Pacific Corp., and also Chesapeake Corp. hovering near break-even levels. Producers are hoping that a general economic recovery later in the third quarter will get volumes moving again and perhaps lead to improved pricing in some grades. Industry profits declined 54% in first-quarter 1991 compared with that period a year earlier.

Wood products provided the only bright spot in the second quarter, with prices surging for lumber and plywood as the heavy rains drenched the Southeast and the federal government banned logging on 66,000 acres of forest in the Pacific Northwest pending completion of a plan to save the endangered spotted owl. But the gains in wood prices were more than offset by weak paper and packaging markets. On Wall Street, paper industry stocks had enjoyed some strength as investors bid up shares in anticipation of a cyclical recovery. But analyst Chad Brown of Merrill Lynch warned that some stocks appeared vulnerable as the earnings recovery in market pulp, newsprint, and linerboard may be somewhat more modest than previously expected.

Big three hold ground. International Paper Co. again led the industry in sales, with $3.1 billion in the second quarter. After having held up relatively well in 1990 and first-quarter 1991, profits tumbled 44% in the second quarter as the company suffered from poor uncoated paper and linerboard markets. IP's European operations held their ground, but as the economy weakens on the continent, income will be hurt modestly.

Helped by a $29-million gain on the sale of timberlands, Georgia-Pacific reported net income of $33 million in the second quarter vs $107 million in the year-ago period, but *P&PW* did not include the sale in its earnings summary. Most of the damage for G-P occurred in pulp and paper operations, which saw profits of $110 million in the second quarter compared with $261 million in 1990.

"Pulp and paper markets weakened during the second quarter, but there are some encouraging indications business is beginning to improve," noted G-P CEO T. Marshall Hahn Jr. This is also true for G-P's building-products business, which already showed signs of improving during the second quarter. Improvement hinges, however, on a general economic recovery. In the meantime, the company said it generated free cash flow of $40 million for the three-month period and reduced total debt by about $30 million. As an indicator of the company's strategic focus, G-P ran a full-page advertisement in the *Wall Street Journal* in July emphasizing free cash flow as a better measure of corporate performance than earnings. A 65% decrease in pulp and paper operating earnings compared with second-quarter 1990 undid improvements in Weyerhaeuser Co.'s newsprint and bleached paperboard units, the company said. A relatively high level of scheduled maintenance downtime also contributed to a 39% decline in earnings, although forest products results were up 20% for the quarter, with wood products showing a significant improvement (*P&P*, June 1991, p. 31). Bleached paperboard showed a strong performance for several pro-



Over 300 members of the Pulp, Paper, & Woodworkers of Canada were locked out of Celgar Pulp Co. in Castlegar, B.C., the company's response to more than a week of job actions by the union workers. The lockout has stopped a project started in February to double the mill's capacity by 1993. See story on page 41.

U.S. paper/products industry results.

Companies	Sales 1991	% change 1991/90	Earnings[1] 1991	% change 1991/90
	Second-quarter 1991 ($000)			
Badger Paper Co. Inc.	$16,620	−14.7%	$955	−0.9%
Boise Cascade Corp.	977,870	−6.9	(32,560)	NM
Bowater Inc.[2]	326,196	−4.7	20,244	−12.9
Champion International Corp.	1,178,464	−6.5	4,529	−92.9
Chesapeake Corp.	218,829	−1.8	2,431	−67.6
Consolidated Paper Inc.	220,984	−7.1	24,553	−35.5
Federal Paper Board Co. Inc.	346,200	9.1	24,600	−28.9
Fort Howard Corp.[2]	292,953	0.3	(19,463)	NM
Gaylord Container Corp. (3rd Q)[2]	163,700	−4.9	(24,000)	NM
Georgia-Pacific Corp.[2]	2,981,000	−15.3	4,000	−96.3
P.H. Glatfelter Co.	135,147	−13.9	17,531	−21.3
International Paper Co.	3,100,000	−3.1	104,000	−43.8
James River Corp.[2]	1,169,085	−18.9	22,668	−56.6
Kimberly-Clark Corp.[2]	1,687,800	4.7	123,200	−1.0
Longview Fibre Co. (4/30)	158,106	−3.2	3,279	−78.9
Louisiana-Pacific Corp.	485,000	−3.3	29,200	−23.2
Mead Corp.[2]	1,176,500	−4.2	18,700	−65.2
Mosinee Paper Corp.	46,440	−11.9	(371)	NM
Pentair Inc.	283,835	−3.8	8,881	26.0
Pope & Talbot Inc.[2]	130,727	−9.1	1,798	−79.0
Potlatch Corp.	316,575	−1.5	11,770	−63.6
Scott Paper Co.	1,209,200	−7.6	30,500	−59.1
Sonoco Products Co.	422,235	0.4	22,385	−18.8
St. Joe Paper Co.	144,319	−2.6	6,352	−38.9
Stone Container Corp.[2]	1,327,200	−7.2	(300)	NM
Temple-Inland Inc.	618,300	5.3	40,600	−38.2
Union Camp Corp.	730,689	2.2	29,873	−48.9
Wausau Paper Mills Co. (5/31)	88,222	0.0	8,248	41.2
Westvaco Corp. (4/30)	557,914	−4.3	35,775	−22.2
Weyerhaeuser Co.	2,296,621	−4.0	69,628	−39.1
Willamette Industries Inc.[2]	494,853	0.7	11,564	−73.5
Total	**$23,301,584**	**−5.7%**	**$600,570**	**−53.1%**

[1] Income after taxes, from continuing operations. [2] **Bowater:** 1991 earnings do not include an extraordinary charge of $9 million to retire outstanding debentures. **Fort Howard:** 1990 operating income includes a special charge of $8.75 million related to an employee stock compensation plan and terms of an agreement with the company's former CEO. **Gaylord Container:** Does not include after-tax writedown of $101.2 million for assets, including permanent closure of the Antioch, Calif., East mill. **Georgia-Pacific:** 1991 earnings do not include an after-tax gain of about $29 million on the sale of 49,000 acres of timberland in Washington. **James River:** 1991 earnings include net charge of $3.2 million. 1990 results include protax gain of $51.6 million on sale of nonwovens division, and a pretax charge of $62.9 million related to "discontinuation of unprofitable operations and other nonrecurring items." **Kimberly-Clark:** 1990 results do not reflect loss of $44 million for disposal of Spruce Falls Power & Paper mill. **Mead:** 1990 results do not reflect loss of $7.7 million for discontinued operations. **Pope & Talbot:** 1990 results include gain of $1.5 million on sale of timberlands. **Stone Container:** 1991 earnings include a $17-million pretax gain from an accounting conversion related to the replacement of equipment following a boiler explosion.
Willamette Industries: 1991 results include charge of $1.9 million from the closing of an Oregon plywood plant.

( ) = losses. NM = not meaningful.

ducers in the quarter, with prices raised 5% in June and evidence that the increase was holding.

Paperboard doldrums. Stone Container reported a small $300,000 loss compared with a gain of $29.5 million in second-quarter 1990, due to lower selling prices for most of the company's products. Its Canadian newsprint operations are taking a severe beating. Stone-Consolidated Inc. incurred a restructuring charge of $6 million in the quarter, partly offsetting a $17 million gain from an accounting conversion relating to a boiler explosion at Missoula, Mont. In late June, Stone announced a "partial price restoration" for linerboard to $380/ton, but some analysts doubt it will be successful, as current tightness in the market is partly due to maintenance downtime and temporary mill shutdowns.

Other board producers who suffered in the second quarter include Union Camp Corp., which was also impacted by weak pricing in its white paper markets and higher depreciation and interest charges related to its three-year, $2.4-billion expansion and modernization program (*P&P*, August 1991, p. 31). Temple-Inland Inc. said its containerboard group suffered a 65% drop in operating earnings to $14.2 million compared with 1990, although containerboard production and box shipments were up from the previous year. The company's Financial Services earned $17 million, up 13% from 1990, with a total portfolio of $6 billion. In late July, Temple-Inland's two thrifts jointly acquired the failed Southwest Federal Savings Assn. of Dallas, Texas, a move that more than doubles the size of the group. Financial Services netted Temple-Inland $503 million of total revenue of $2.4 billion in 1990.

Gaylord Container Corp. reported a $125.5-million loss for the quarter ending June 30, 1991, compared with a loss of $6.9 million for the same period last year. In a press release, Gaylord said that the loss was magnified by the $101.2-million after-tax writedown of assets for the company's idled Antioch, Calif., East Mill. Besides the $125.2-million charge for the asset write-down, the company blamed the lower primary and converted selling prices and changes in product for a negative impact on operating earnings of about $15 million. Its pretax earnings were also adversely affected by a $7.1-million rise in the net interest expense, according to the company.

White papers at the bottom. Although price increases have been announced for cut-size and forms bond papers, major damage was inflicted on printing and writing paper manufacturers in the first half of the year. A $32.5-million loss in the second quarter brought Boise Cascade's total losses in 1991 to $49.4 million, compared with a gain of $56.6 million in the first six months of 1990. Hit hard by price cuts, Boise said its paper and paper products segment reported its first operating loss ever, as prices for uncoated white paper declined an average of 16% in the second quarter. The company was aided by higher wood products prices, but, unfortunately, high woodchip costs continued to have a negative effect on the cost of producing pulp and paper in the Pacific Northwest.

Champion International was ravaged by lower prices for its coated grades, as substantial capacity came online in the midst of weak demand, while publication papers, newsprint, and market pulp operations also remained in the doldrums. Champion produces 10% of all U.S. uncoated free-sheet and 14% of coated free-sheet, and the company's operations in Canada and Brazil continued to drain earnings. Westvaco Corp. said the adverse financial impact of its Brazilian operations accounted for 11% of the 16% decline in its quarter ending Apr. 30. Price declines for coated publishing paper were partially offset by increased shipments, said Mead Corp., which also enjoyed improved operations at its publishing papers mill in Escanaba, Mich. The largest U.S. newsprint producer, Bowater Inc., enjoyed increased newsprint exports in the second quarter, posting results that were a bit better than expected. But the third quarter may hold a further 7% reduction in newsprint prices and a 10% decline in market pulp prices, reported Dean Witter Reynolds' analyst Evadna Lynn.

Tissue troubles. Record high marketing expenses to introduce "new or improved" consumer products in the U.S. and Europe ate into Kimberly-Clark Corp.'s earnings, with advertising and promotion expenses accounting for 17.8% of sales in the second quarter, compared with 14.7% at the end of last year. Producers, including K-C and Procter & Gamble Co., recently dropped the list price and the sheet count of premium bathroom tissue and will presumably reduce promotional activities, such as coupon offers to consumers. Decreasing pulp prices came to the aid of many tissue makers, and international operations proved to be a boost to income. K-C cited a strong performance from its Mexican affiliate, while Scott Paper Co. singled out U.K. operations and its joint venture with Feldmühle AG for its 80% rise in European earnings.

Scott Paper was weighed down by its struggling S.D. Warren Co. printing and publishing papers business, which suffered a 12% drop in sales in the quarter, with income down 90% compared with the same period in 1990. Results from James River Corp.'s European tissue ventures were significantly improved, the company said, but the competitive U.S. retail premium tissue markets and "persistent" softness in commercial tissue markets made for the difficult conditions. ■

Canadian earnings worsen

Canadian pulp and paper industry losses in the current market downturn appear even worse than the red ink manufacturers spilled in 1982, according to most industry observers. A *Pulp & Paper Week* survey of earnings for 19 Canadian forest products companies revealed a whopping loss of C$263.3 million in the quarter ending June 30, compared with a loss of C$108.9 million in the second quarter of 1990. Only four of the companies surveyed showed any profit. While many observers had predicted serious losses for the quarter, the depth to which profits have fallen at some of the major Canadian companies startled even some seasoned analysts. Sales in the quarter declined 11.2% from C$6.2 billion in 1990 to C$5.5 billion in 1991 among the companies surveyed.

"We have had to curtail production of all our major products in varying degrees due to market conditions," said Bob Findlay, CEO of MacMillan Bloedel Ltd., which shut down several wood products plants and felt downtime in containerboard, pulp, and newsprint. "These types of decisions are painful," Findlay added, "but necessary if the company is going to remain competitive."

Comparisons with the recession in 1982 are common, with analysts noting that prices and demand have fallen faster and deeper in the current down cycle, but conditions are mitigated by interest rates that, although high, are considerably lower than in the early 1980s. Other positive factors include somewhat lower debt within the industry than in 1982 and the potential to bounce back quickly as the drop in capital expenditures translates into a drop in capacity expansion. Debt/equity ratios are better, noted Price Waterhouse analyst Mike MacCallum, and share prices in Canadian forest products companies are the highest they have ever been as investors look beyond the present economic quandary. Several Canadian companies are taking advantage of it by making share offerings and raising much needed cash. Unlike the early and mid-1980s, Canadian manufacturers are currently vexed by a climbing Canadian dollar, which hovered above US86¢ for a significant portion of the second quarter. Low-return environmental projects remain a costly development in recent years. The current downturn is at least "as bad as 1982," MacCallum said. "But the industry is in better financial shape to withstand the recession," he added.

No relief in East. Canadian paper manufacturers in the eastern provinces have been hit especially hard, with the worst decline in newsprint markets in 15 years. From an eastern perspective, the current recession will certainly be worse than in 1982. Abitibi-Price Inc. continued to wallow in red ink, with another restructuring charge further reducing meager operating profits. The company reported a net loss of C$5.7 million in the second quarter, compared with a loss of C$3.7 million in the same three months in 1990.

"We're not sitting still while all this is going on," said Abitibi's investor relations manager, Robert J. Tait. The company is making headway in reducing costs, he added, as part of "a fundamental change in the industry in order to be competitive."

Domtar Inc. reported a net loss of $37 million on a 23% decline in overall sales. Sales of newsprint, groundwood specialties, and market pulp dropped 9% to C$100 million, while sales of fine paper plummeted 21% to C$164 million in the quarter, the company said. Operating losses in those areas totaled C$26 million. Sales in the packaging division fell 14% in the quarter to C$101 million, and operating profit fell to C$2 million from C$6 million in second-quarter 1990.

Packaging products showed slight improvement for Canadian Pacific Forest Products Ltd., with firming demand late in the quarter offsetting lower prices, although plans remain to sell off the business. CP Forest posted a severe C$56-million loss in the quarter, with losses over C$100 million in the first six months of the year, as the company experienced "deteriorating market conditions in all business sectors." Downtime in the paper markets added pressure on pulp demand, delivering a one-two punch to several producers. Capital spending at CP Forest for the first six months of 1991 was C$233.3 million, up from C$214.5 million in 1990. In contrast, capital spending at Noranda Forest Inc. dropped 45% to C$152 million in the first six months of the year, reflecting the "minimum required to maintain operations," the company said. The company lost C$42 million in the quarter, with total losses at C$80 million so far this year.

Mess in the West. Improvement in lumber prices came as a welcome sign to western forest products companies, but the good news was tempered by rising labor costs and the stronger Canadian dollar. Fletcher Challenge Canada Ltd. posted one of the largest losses in British Columbia, reporting a second-quarter loss of C$16.5 million compared with a gain of C$37 million in 1990. The company's CEO, Ian Donald, said pulp prices by the end of the quarter were down US$240/metric ton from the same time last year. The company's U.S. subsidiary, Blandin Paper Co., continued to face weak markets for its lightweight coated paper, Donald said, though he hopes that antidumping charges against European producers may help shore up demand in the latter half of the year.

MacMillan Bloedel, which has performed reasonably well over the current down cycle, reported a net loss of C$11.3 million, compared to profits of C$28.8 million in second-quarter 1990. The company, which was one of the worst hit in the 1982 downturn, shut its linerboard operation in Alabama for a month as part of a capital program to improve quality and expand recycled fiber use. Canfor Corp. lost C$15.7 million in the second quarter as losses in pulp outweighed gains in lumber. During the quarter, the company invested C$50 million in preferred shares of its Howe Sound Pulp & Paper Ltd. joint venture. The boost in lumber prices may be short lived, according to Weldwood of Canada Ltd., part of Champion International Corp., although June figures revealed rising U.S. housing starts. With its Caribou Pulp & Paper joint venture and its Hinton, Alta., mill improving operations, Weldwood managed to squeak out a profit in the second quarter but said it does not expect these positive factors to continue into the third quarter of this year.

Tissue tightens. The other Canadian paper manufacturers that managed to turn a profit in the otherwise dismal quarter were small tissue makers in both the East and West. Competition in the tissue market is intense, companies reported, with capacity increases beginning to affect both pricing and volumes. The entry of Procter & Gamble Co. into the Canadian market through its acquisition of CP Forest's Facelle business will further increase competition. But, despite its 11% decline in sales revenue, industry leader Scott Paper Ltd., based in Vancouver, B.C., again managed not only some profit, but a 0.5% improvement over earnings in second-quarter 1990, helped by declining pulp prices. Cascades Inc. of Quebec turned a 2.4% increase in sales into earnings of C$2.6 million, a decline of 48% from year-earlier results. The Port Cartier, Que., pulp mill was a serious drag on earnings, but a temporary shutdown in the second quarter should reduce some of its losses in the coming months, Cascades said.

Perkins Papers Ltd. of Laval, Que., holding a 4% share of the Canadian tissue market, also showed profit, though results were down 43.5% from second-quarter 1990. By tripling capacity at its Candiac, Que., mill this year to 70,000 tpy, Perkins will become Canada's third-largest tissue maker, climbing past Kimberly-Clark Canada Ltd. and Cascades and possibly garnering a market share of 10%. ■

Canadian paper industry results.

	Second-quarter 1991[1]			
Companies	**Sales 1991**	**% change 1991/90**	**Earnings 1991**	**Earnings 1990**
Abitibi-Price Inc.[2]	C$729,700	−9.1%	C$ (5,700)	C$ (3,700)
Canadian Pacific Forest Products Ltd.	532,800	−15.7	(56,400)	6,600
Canfor Corp.[2]	214,000	−9.6	(15,700)	30,500
Cascades Inc.	204,025	2.4	2,591	5,049
Crestbrook Forest Industries Ltd.	42,192	−25.6	(3,351)	3,532
Dorman Industries	142,349	−5.7	(10,379)	2,916
Domtar Inc.	468,000	−9.8	(37,000)	29,000
Donohue Inc.	125,400	−20.9	(3,800)	5,900
Fletcher Challenge Canada Ltd.[2]	269,500	−9.8	(16,500)	37,000
MacMillan Bloedel Ltd.	727,900	−9.8	(11,300)	28,800
Noranda Forest Inc.	1,085,000	−11.6	(42,000)	(4,000)
Perkins Paper Ltd.	36,644	−2.1	974	1,726
Repap Enterprises Inc.	283,900	−7.1	(34,600)	4,200
Rolland Inc.	76,160	−27.0	(1,360)	2,088
Scott Paper Ltd.	105,060	−10.7	3,213	3,198
Slocan Forest Products	56,000	−7.0	(133)	1,900
Tembec Inc. (3rd Q)[2]	65,219	4.6	(31,933)	4,539
Weldwood of Canada Ltd.	193,700	1.7	100	6,800
West Fraser Timber Co.	151,400	1.3	(34)	5,100
Total	**C$5,508,949**	**−11.2%**	**C$(263,312)**	**C$108,972**

1. Income after taxes, from continuing operations. 2. **Abitibi-Price:** 1991 income includes C$20-million charge related primarily to restructuring. 1990 results include a C$28.9-million charge. **Canfor:** 1990 results include an aftertax gain of C$26.2 million from the sale of assets. **Fletcher-Challenge:** 1990 results include a C$20.7-million gain on the sale of a plant. **Tembec:** 1991 results include a C$32.1-million pretax charge related to a writedown of capitalized startup costs and deferred charges by 50%-owned Temboard Ltd.

(   ) = losses

NEWSPRINT

Boise finds partner for recycled newsprint project

Boise Cascade Corp. said early last month it had found a joint-venture partner for a recycling project at its 560-tpd West Tacoma newsprint mill in Steilacoom, Wash. The company would not disclose the name of the partner in the $50-million project, saying the party did not want to be identified. Boise announced last week that it had selected Harnischfeger Industries' Beloit Corp. unit as the lead vendor for the project, with Beloit's Fiber Systems Div. providing the complete secondary fiber/deinking line equipment. Beloit's Project Management Group will design and install the recycling facility, to be built adjacent to the mill.

The facility will consume up to 300 tpd of old newspapers (ONP) and old magazines (OMG), producing 225 tpd of deinked pulp. Upon completion of the project in mid-1993, newsprint produced at West Tacoma will contain 40% recycled fiber, the company said.

U.S. firms dominate global industry survey

International Paper Co. continues to be the world's number one forest products company, and the industry as a whole is the tenth-largest global industry, according to *Fortune International*'s annual Global 500 survey. The world's top 26 forest products manufacturers had combined sales of $142.5 billion in 1990, and the world's number one industry, petroleum refining, totaled $941.8 billion in sales with 54 companies. In a global comparison, IP ranked ninety-fifth in sales at $13.0 billion in 1990 and two hundred and twenty-first in market value at $7.8 billion, *Fortune International* reported.

A worldwide recession continues to take its toll on the industry, the survey said, with return on sales falling from 5.3% in 1989 to 2.7% last year. The median for all industries was 3.3%. Return on assets fell from 4.5% in 1989 to 2.3% in 1990, compared with a median of 3.4%. Global profits in the industry tumbled 41.7% in 1990, the second worst performance, behind the rubber and plastics industry. Forest products sales rose 4.1% last year. Mergers were responsible for boosting several paper companies up in financial rankings, with the most notable growth experienced by Repola Oy of Finland, Stora AB of Sweden, and Georgia-Pacific Corp. ■

Global top ten forest products companies by sales, 1990.[1]

Company, country	Global ranking	Sales (US$ million)
International Paper Co., USA	95	$12,960
Georgia-Pacific Corp., USA	100	12,665
Stora, Sweden[2]	116	11,070
Weyerhaeuser Co., USA	147	9,024
Noranda Forest Inc., Canada	164	8,121
Fletcher Challenge Ltd., New Zealand	188	7,134
Kimberly-Clark Corp., USA	214	6,448
Repola Oy, Finland	233	6,040
Stone Container Corp., USA	242	5,770
James River Corp., USA	261	5,423

1. Includes only companies which have derived more than 50% of sales from manufacturing. Sales of consolidated subsidiaries are included. Figures converted into dollars using official average exchange rate during company's 1990 fiscal year. 2. Includes Feldmühle Nobel of Germany.

Source: *Fortune International*

SCA approves U.K. mill expansion

Svenska Cellulosa SA (SCA) of Sweden gave final approval to a new newsprint machine at the former Reedpack Ltd. newsprint mill in Aylesford, Kent, to lift capacity to 320,000 metric tpy from 80,000 metric tpy. SCA acquired the mill in June 1990, when it acquired Reedpack for $924 million, and the SK2.5-billion expansion project has been on the drawing board since late last year. Earlier this year, SCA sold off Reedpack's Colthrop mill, the converting operations of Field Packaging, and its own Ortmann consumer tissue operations in Austria. Newsprint production in the U.K. increased 230,000 metric tpy late in 1989 with the startup of Shotton Paper Co. Ltd., a subsidiary of Finland's United Paper Mills. This year, Abitibi-Price Inc. made the decision to withdraw from a 220,000-metric-tpy greenfield recycled newsprint mill it was planning to develop in Scotland.

The Aylesford mill currently has one paper machine, which dates back to 1958, and manufactures newsprint, lightweight newsprint, and 75,000 metric tpy of deinked pulp. The current operations also include a paperboard and converting mill with three operating machines. Before the recent SCA acquisition, Reedpack was developing plans to install a 240,000-metric-tpy, recycled-newsprint machine at Aylesford in a joint-venture project with Daishowa Forest Products Ltd., the Canadian subsidiary of the Japanese papermaker Daishowa Paper Manufacturing Co. Ltd. The mill is currently a unit of SCA Graphic Paper AB, a division of SCA Group. ■

Boise sells stake in Duropack venture

Boise Cascade Corp. agreed in July to sell its 50% stake in Duropack AG, a corrugated container manufacturer with two plants in Austria and one in Germany, to its Austrian partner in the joint venture, Constantia AG. Boise said it expects the gain on the $50-million sale will have a positive impact on its third-quarter results. Last year, Boise outlined plans to divest noncore operations and sold two corrugated container plants in the U.S. to Jefferson Smurfit Corp. For similar reasons, Georgia-Pacific Corp. sold its French corrugated packaging business to International Paper Co. last year. ■

First of three Chilean pulp projects finished

Chilean exports of pulp will more than double to 1.5 million metric tons from 1990 to 1992 with the startup of three major projects this year. Celulosa Santa Fe, a 230,000-tpy, bleached-eucalyptus pulp mill in Nacimiento, Chile, owned by Shell (60%), Scott Paper Co. (20%), and Citicorp (20%), started up in mid-April, confirmed a spokeswoman at Scott Paper in Philadelphia, Pa. The partnership purchased the troubled, half-finished project in 1988 from Papeles Sudamerica. Additional work included expanding the Kamyr digester, adding oxygen delignification, and redesigning and expanding the mill's bleaching system. More than half of the output will be taken by Scott for its worldwide operations.

Celulosa del Pacifico, a joint venture between Cia Manufacturera de Papeles y Cartones SA (CMPC) and Simpson Paper Co., is progressing with its $587-million greenfield market pulp mill located near Angol, Chile. A Simpson spokesman confirmed that the 320,000-metric-tpy, bleached-softwood mill is expected to be in operation in the third quarter and was currently on schedule and on budget.

Celulosa Arauco y Constitucion SA's recently completed 350,000-metric-tpy, bleached-softwood pulp mill in Arauco, Chile, will begin operations this month or in October, somewhat ahead of schedule. The $600-million Arauco II project is next to the company's existing 20-year-old mill, which was expanded in 1989. ■

ISSUE FOCUS: ENGINEERING

Project Cost Escalation Rate Slows as Companies Reduce Spending Plans

Equipment, engineering, and material costs for paper mill construction projects have stabilized, but labor costs are still rising

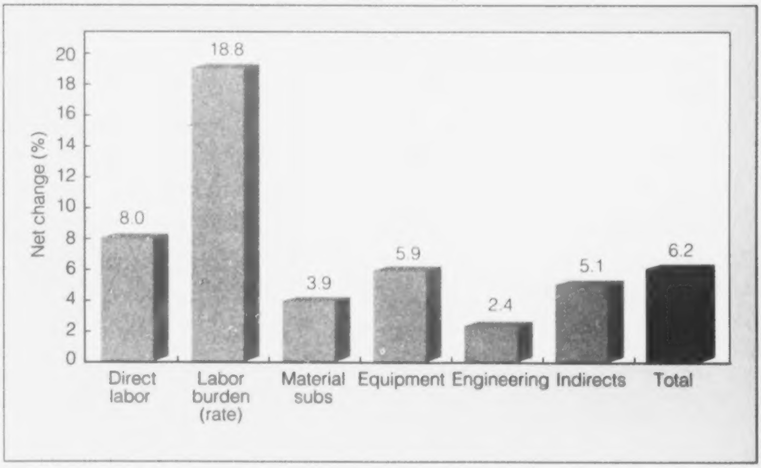
By KEN L. PATRICK, Editor in Chief

The escalation rate for capital project costs in the U.S. pulp and paper industry has slowed considerably during the past six quarters, according to a July 1989 through December 1990 capital cost trends study by BE&K Construction. The report, which covered almost all areas of an integrated pulp and paper mill from the woodyard through finishing and shipping, showed an overall cost increase of 6.2% for the study period, compared with more than twice that for the 1987 through 1989 period.

BE&K attributes the slowdown to a recently decreased demand associated with reduced capital expenditures. *Pulp & Paper* reports that capital spending in the paper industry this year will fall to around $14 billion after peaking at some $17 billion last year, following seven years of record spending by U.S. companies. Capital spending in 1992 is expected to decline further to $12.5 to $13 billion.

LABOR COSTS STILL RISING. The BE&K study showed that the previously high rate of escalation for mechanical equipment generally stabilized, while labor costs continued to rise. As Figure 1 reflects, construction on projects procured during 1988 and 1989 peaked in 1990, resulting in fairly high wage increases during the six quarters. Labor costs shot up 8% as a result, and the labor burden rose a dramatic 18.8% in response to "incentive plans and per diem payments designed to retain and attract workers in the construction work force, plus premium time expenditures designed to stretch the work force and maintain completion schedules," the study pointed out.

FIGURE 1: **The paper industry's rate of escalation has begun slowing down, with a July 1989 to December 1990 increase of only 6.2%, compared with more than twice that amount in the previous period. Labor and its associated labor burden increased more than other construction costs during the current six-quarter study.**

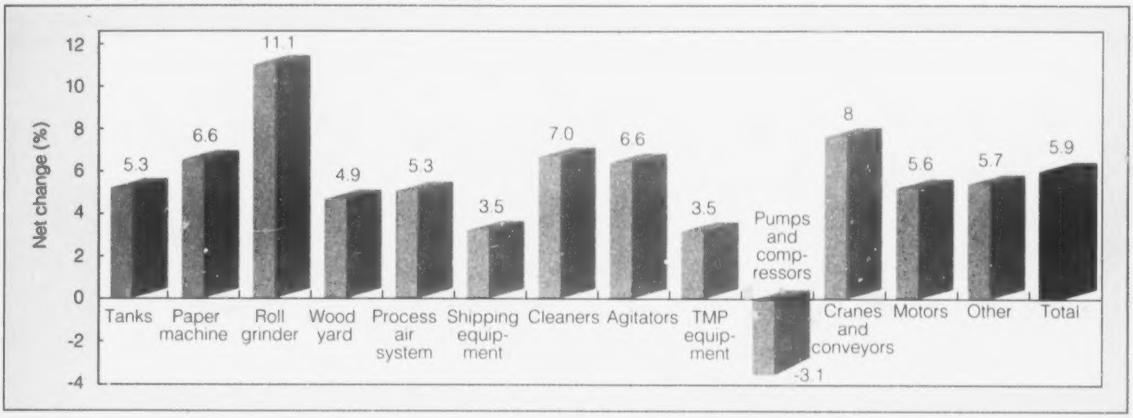


However, as project workloads have begun declining in the current fourth quarter, prices in the labor market have stabilized, "although demand will remain high for specialized welders and technicians. The shortage of skilled construction workers will continue, but peak demand experienced in 1990 has passed."

Material costs showed mixed results at a 3.9% escalation rate. Increases (which tended to offset the slight declines in metal costs) were due to two primary factors, according to the study—fabrication labor increases and increased fuel (transportation) costs that occurred immediately after Iraq invaded Kuwait. Mechanical equipment costs were effected by the high labor costs and only modest raw material price increases, resulting in a net escalation of 5.9%, which is slightly below the project average.

Engineering costs escalated at only 2.4%, the lowest of all categories. The report explained that this relatively small increase "illustrates the combined effect of

FIGURE 2: **Mechanical equipment price increases were mixed for the six-quarter period, with roll grinding equipment prices rising by 11.1% and pumps and compressors actually declining by 3.1%.**



modest wage increases and adjusted overhead and profit components. The overhead portion of engineering costs is increasing as fixed costs are spread over a smaller engineering volume. However, the profit component is decreasing as competition heats up for current work," it concluded.

NEAR-FUTURE OUTLOOK. Based on results of the study, BE&K believes demands on the construction labor market will continue declining through this year. "Since an immediate rebound in the other process industries and segments of the economy does not appear likely until 1992 or later, a softening of the labor market will be felt. Even though wages may remain constant, a reduction in the incentive portion of the labor burden will eventually result in a cost decrease," the report states.

As far as material costs are concerned, the decreases experienced in stainless steel should soon be followed by price drops for lumber products, steel, copper, and aluminum. Increases in material costs for 1991 should be less than 4%, and energy costs are expected to remain stable following a satisfactory resolution to the Gulf crisis.

Minimum wage increases for engineers and additional pressures on consultant companies to reduce profit markups are expected as demand for pulp and paper engineering services declines through the remainder of 1991 and into next year. As a result, engineering costs should remain stable, with minimal or no increases anticipated. However, engineering costs could increase somewhat as companies invest more in new 3-D computer design capabilities.

The shortage of engineering personnel experienced during the 1984-90 growth boom could be extended by two or three years. Increased competition will be felt for engineers to support expansion of other process industries and to help rebuild Kuwait.

EQUIPMENT AND MATERIAL COSTS. Figure 2 shows changes in 13 specific mechanical equipment prices from July 1989 through December 1990. During these six quarters, the cost of roll grinding equipment and cranes and conveyors increased the most, with 11.1% and 8% increases, respectively. While woodyard, shipping, and

FIGURE 3: **Concrete material prices fluctuated considerably during July 1989 to December 1990, with an overall modest increase of only 3%.**

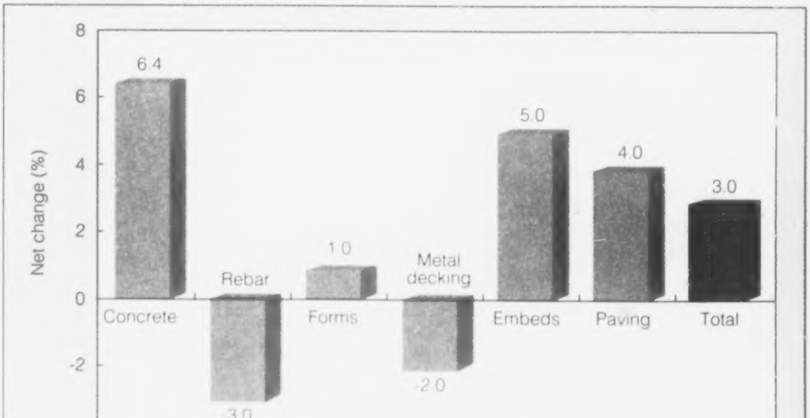
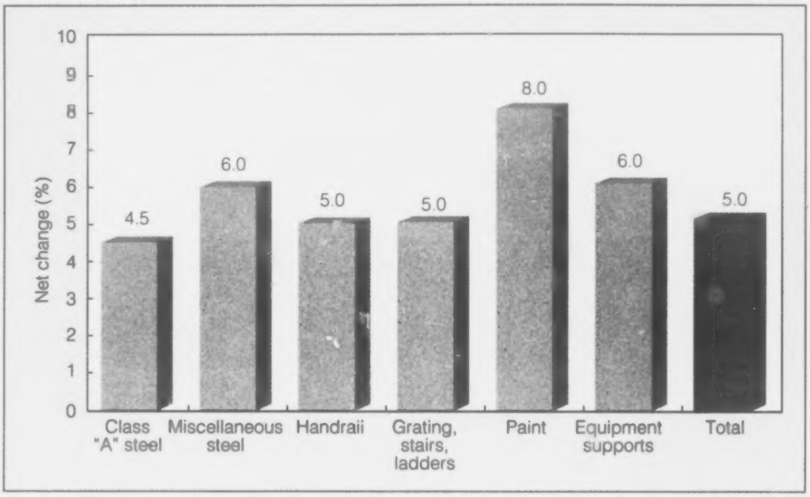


FIGURE 4: **Structural steel prices increased 5% during the study period, with paint prices rising the most to 8%.**



thermomechanical pulping equipment costs rose only moderately, pump and compressor prices tumbled 3.1%. Based on a 1985 base of 100, mechanical equipment in the paper industry has escalated to a current index of 148.

Concrete materials experienced considerable fluctuations during the period (Figure 3). While the price of concrete itself increased 6.4%, rebar and metal decking fell 3% and 2%, respectively. The cost of forms remained almost flat. Overall costs of concrete materials rose only a modest 3%. Using the 1985 base of 100, concrete materials have escalated to an index of 119.

Figure 4 shows that the cost of structural steel rose 5% during the six quarters of the study period. Leading the pack was paint at 8%, with the price of class "A" steel rising only 4.5%. On the 1985 base of 100, structural steel is currently at an escalation index of 126.

The overall price of piping materials rose only 0.5% during the six quarters (Figure 5). The key price decrease was for small-bore stainless steel piping, which fell a full 6% during the period. Large-bore carbon steel pipe prices increased 8.4% and hanger costs increased 6%, but otherwise, price increases were extremely moderate. For piping materials, the 1985 escalation index is currently at 143.

Costs for instrumentation materials (Figure 6) and electrical materials (Figure 7) rose 3% and 4%, respectively. Machine profile systems experienced the greatest increase among instrumentation materials at 4%, and prices for tube and tray material remained completely flat. Prices of electrical tray and instrument wiring materials both decreased 8% during the six quarters, and the cost of primary wiring rose 13%. The 1985-based escalation index for instrumentation and electrical materials is currently 126 and 142, respectively.

The prices of architectural sections and materials increased 6% overall (Figure 8). Siding went up 11% during the study period, while built-up roof costs remained flat. The 1985-based architectural index is currently at 128. ■

FIGURE 5: **Overall, the price of piping materials increased only 0.5% during the six-quarter study period. Small-bore stainless steel prices fell a full 6%.**

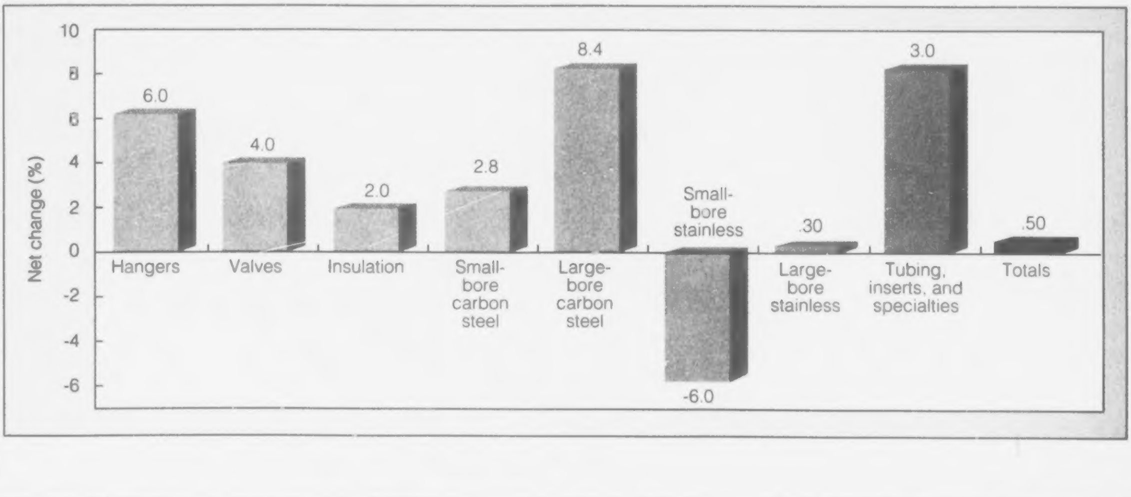


FIGURE 6: **Instrumentation costs were up only 3% during the current study, with machine profile systems increasing the most at 4%.**

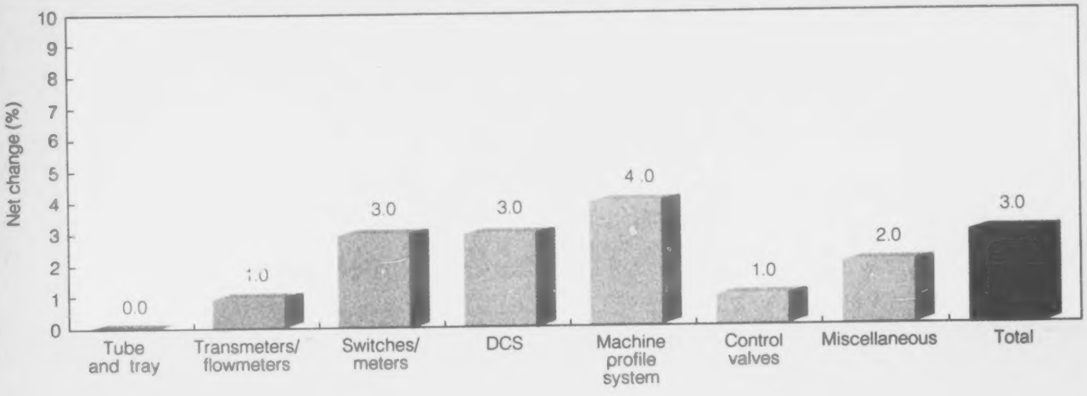


FIGURE 7: **Electrical material costs rose only moderately, even though primary wire was up 13%. The overall increase in this area remained relatively low due to major drops in tray and instrument wire prices.**

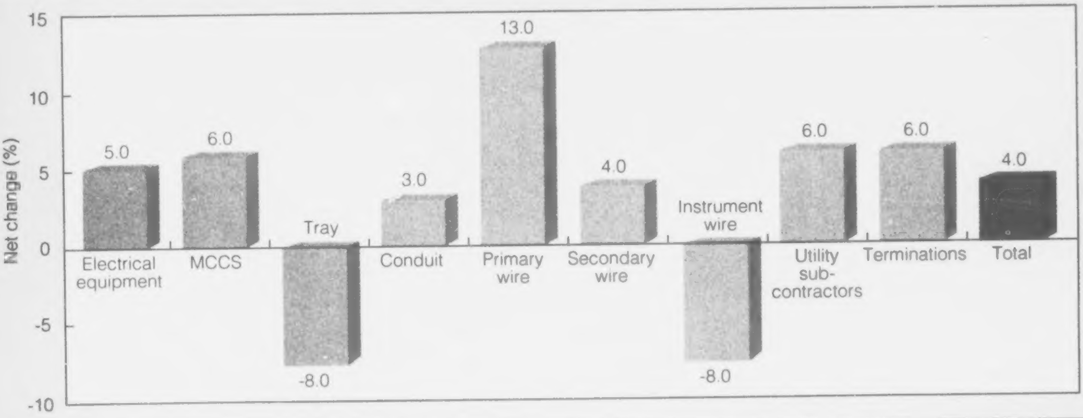
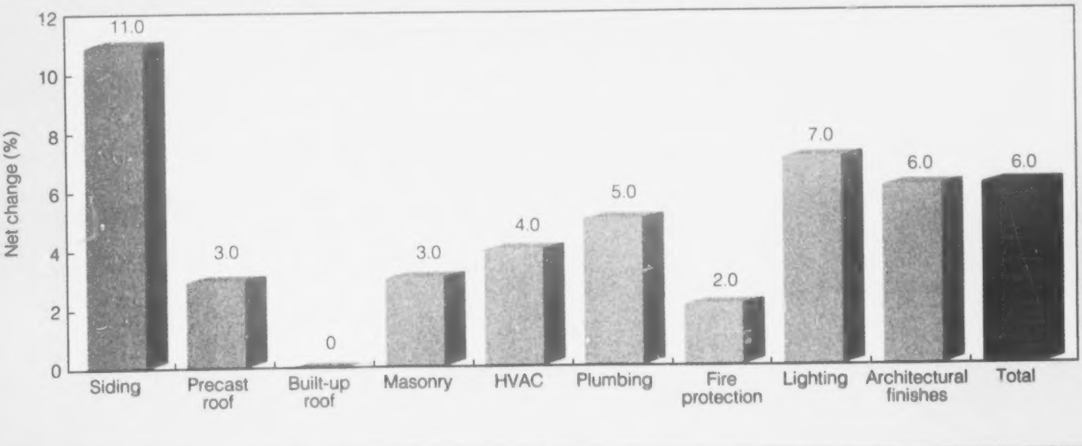
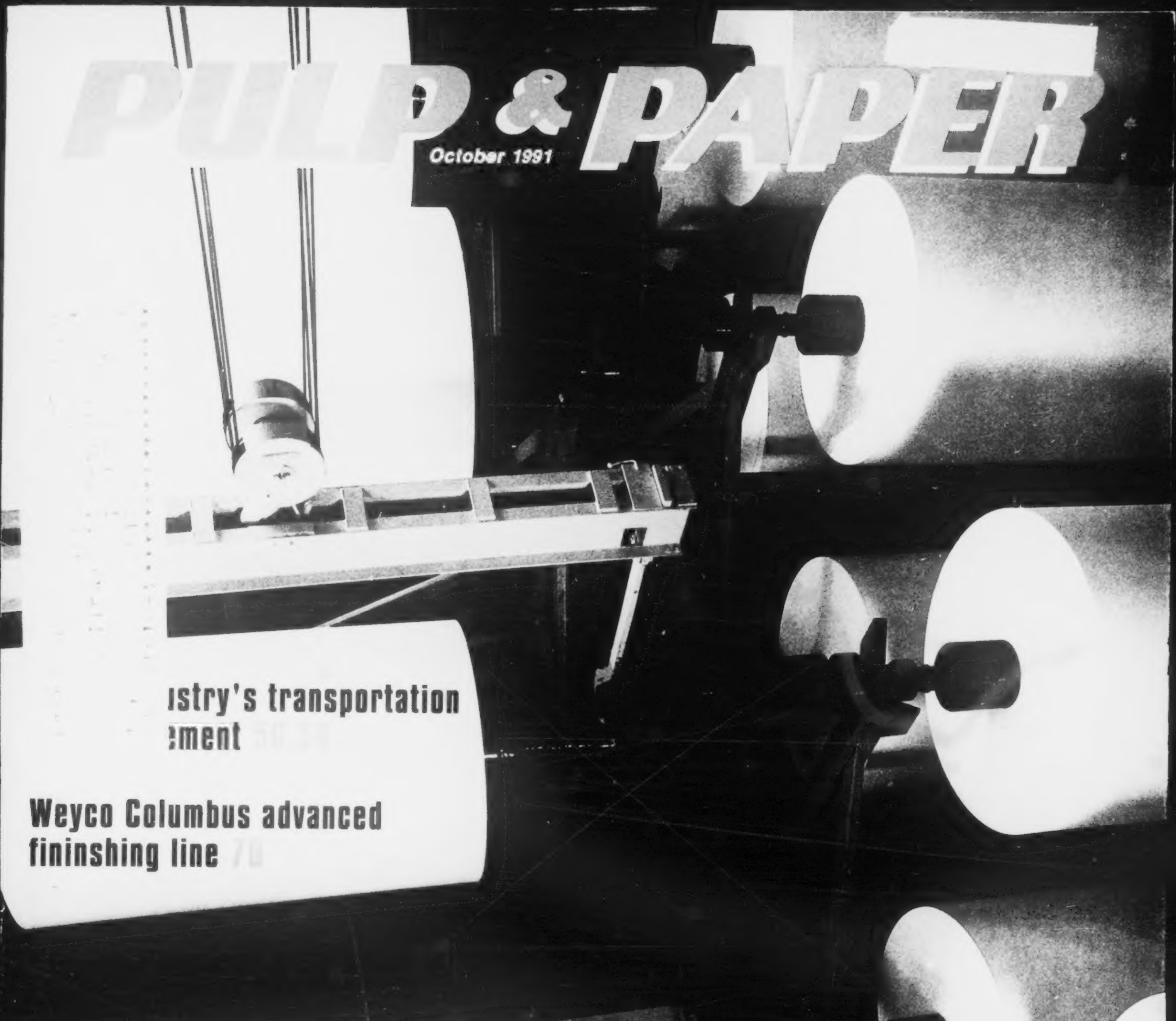


FIGURE 8: **Prices for architectural sections and materials increased 6% overall, with siding prices rising 11% and built-up roof costs remaining flat during the study period.**





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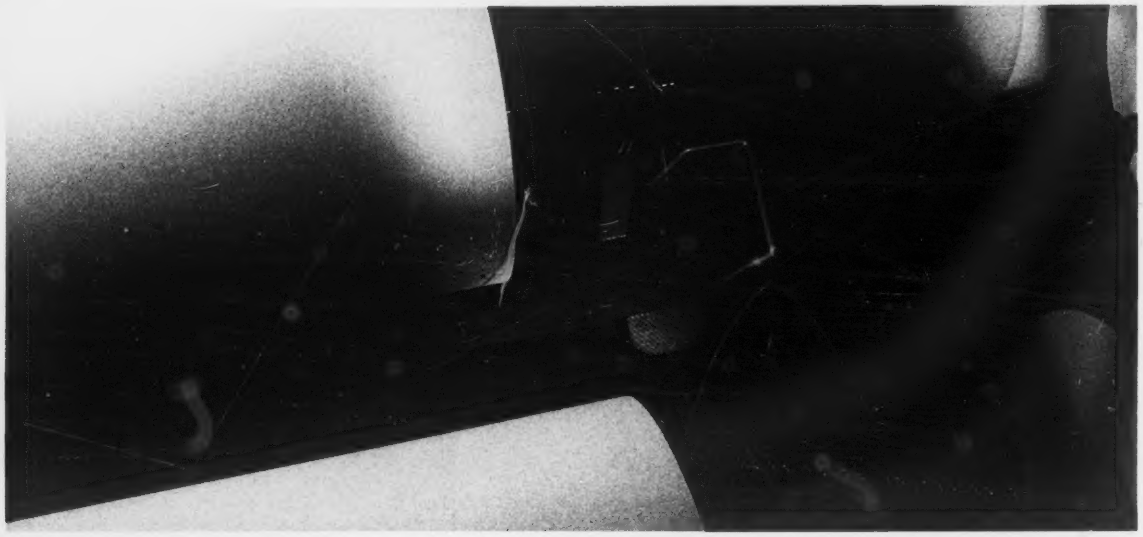

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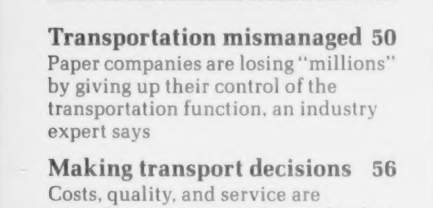

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This issue's dual focus looks at the "end of the line" for most pulp and paper mills—finishing/converting and transportation—including discussion of the latest advancements in finishing technology. On the cover, Sylvester Molski, an employee at Consolidated Papers' Wisconsin Rapids Division, positions a reel of paper in the 64-1 blade coater transport cart. (Photo courtesy of Consolidated Papers Inc.)

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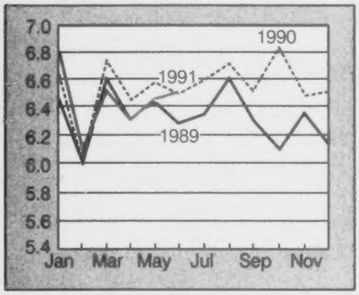
ABP

BPA

MONTH IN STATISTICS

U.S. paper and board production



U.S. production of paper and paperboard totaled 6.5 million tons in June, unchanged from a year earlier, according to the American Paper Institute. The trend of production turned upward during the second quarter, raising the seasonally adjusted rate of production to 77.6 million tpy, up 3.6% from the March 1991 low and within 0.5% of last year's record total of 78.7 million tons. The biggest gains were in the paper grades, up 4.6% since March. The seasonally adjusted rate for paper during the first half was 38.4 million tpy, still down 1.6% from the year-ago period, while the rate for paperboard stood at 39.3 million tpy, up 0.6%.

Among major grades, containerboard output was up 1.0%, thanks to a 12.8% increase in production for export. Newsprint production is up, but shipments from North American mills were off 7.1% in the first half due to continuing weakness in advertising markets. Printing and writing shipments were off 3.9% from last year, but the uncoated grades were trending upward in May and June.

Canadian newsprint shipments totaled 719,000 metric tons in June, down 10.6% from June 1990. Newsprint mills operated at 85% capacity, down from 89% last year. Woodpulp shipments climbed 10.1% to 717,000 tons, as operating rates rose from 84% last year to 89%. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	June	559	3.7	6,760	4.6
Uncoated groundwood (s)	June	142	0.0	1,685	-2.7
Coated paper (s)	June	594	73.2	7,022	-4.6
Uncoated free-sheet (s)	June	919	1.7	11,042	-3.5
Other printing/writing	June	117	-4.1	1,511	-6.6
Total packaging and other paper (s)	June	367	-6.9	4,473	-2.1
Tissue	June	474	-1.0	5,746	0.3
Total paper	**June**	**3,172**	**-0.6**	**38,238**	**-1.7**
Unbleached kraft paperboard	June	1,672	-0.5	20,140	1.2
Semichemical medium	June	467	0.0	5,644	-0.5
Bleached paperboard	June	381	1.3	4,592	1.6
Recycled paperboard	June	763	3.4	8,914	-1.3
Total paperboard	**June**	**3,282**	**0.6**	**39,291**	**0.4**
Total U.S. paper and paperboard output	**June**	**6,454**	**0.0**	**77,529**	**-0.6**
PULP, WASTEPAPER & FIBER[2]					
Total U.S. woodpulp production	May	5,162	0.1	63,307	1.6
Market pulp production	May	708	1.4	9,011	5.5
Wastepaper consumption at paper/board mills	May	1,763	-2.1	21,161	2.6
Pulpwood consumption (cords)	May	8,108	-0.1	99,494	0.2
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	June	25.739	-2.9	156.832[6]	-2.0
Containerboard inventories at U.S. box plants and mills	May 1	2,883	11.2		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	May	1,008	-8.4	12,256	-7.6
Imports of Canadian newsprint	May	646	-9.9	7,740[6]	-9.0
U.S. paper exports (including products)	May	698	27.6	8,143	19.5
Exports of unbleached kraft linerboard	May	260	28.7	3,066	16.5
Exports of woodpulp	May	576	30.0	6,396	11.5
Norscan pulp inventories[4]	June 30	1,611	15.3		
Norscan pulp operating rates[4]	June	86%	85%	84%	89%
CANADIAN STATISTICS[5] *(reported in metric tons)*					
Total newsprint shipments	June	719	-10.6	4,370[6]	-7.8
Operating rates	June	85%	89%	89%	95%
Inventories held by U.S. consumers	June 30	1,410	7.1		
Other paper/board shipments	June	612	-1.3	3,576	-3.2
Woodpulp shipments (export only)	June	717	10.1	4,168	9.5
Operating rates	June	89%	84%	89%	89%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

Market pulp: Wave of new capacity will keep operating rates and prices under pressure

Grade structure: Chemical paper-grade market pulp is sold in the open market and does not include captive pulp used onsite or shippped to affiliated mills within North America. Pulp is divided into grades based on whether it is made from softwood or hardwood fiber, produced by the sulfate (kraft) or sulfite pulping process, and by the amount of bleaching.

Northern bleached softwood kraft (NBSK) is the premium pulp grade because of its long fiber length and strength. U.S. chemical paper pulp statistics include about 2 million tons of fluff pulp production (including exports) used in diapers and other absorbent hygiene products. Dissolving and mechanical pulp grades are excluded from the statistics.

Production/capacity: The pulp market has been in a downward slide since early last year but has probably hit bottom. The price of northern bleached has come crashing down from a list of $830/ton at the peak of the cycle in 1988 to $525/ton and below currently. This is adding pressure to other grades such as southern pine and hardwood, which dropped sharply in price last year.

High inventories built up by Canadian producers in anticipation of a strike this fall that didn't happen is contributing to the recent collapse in softwood prices. Producer inventories of chemical paper-grade market pulp hit 1.745 million metric tons at the end of August—their highest level since March 1985. Inventories of northern softwood reached an unusually high level of about 45 days of supply vs about 20 to 30 days for sourthern hardwood and eucalyptus pulps.

However, Canadian producers will probably take substantial downtime this winter as prices drop below variable costs of many mills. This should result in a drop in inventories and bring the market into somewhat better balance. Even though production will be up about 3%, Canadian producers are forecast to average only about 82% of capacity this year vs about 94% for lower-cost U.S. producers. This is resulting in significant red ink for Canadian mills, which are also facing high environmental expenditures.

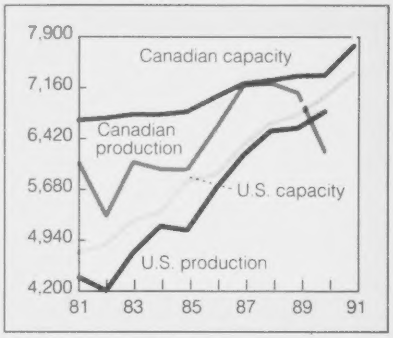
Future outlook: Demand for market pulp is expected to strengthen in 1992 with a cyclical pickup in the world economy. But the recovery in pulp prices is expected to be slow as substantial new capacity starts up over the next several years.

More than 4 million tons of new chemical paper-grade market pulp capacity is expected to startup worldwide over the 1990-93 period. Most of the new expansion is in North America or Latin America. Examples of major new projects starting in the U.S. this fall include Alabama Pine Pulp Co. (450,000 tpy), Stone Savannah River Corp. (240,000 tpy), and Union Camp Corp. (100,000 tpy). This follows startup of major new mills by Daishowa Inc. (340,000 tpy) and Weyerhaeuser Co. (425,000 tpy) last year. In Latin America, the new Aracruz mill (525,000 tpy) and two major expansions in Chile have been completed this year.

All of this new capacity was approved during an unprecedented period of industry profitability in 1987-88. Unfortunately, it will be coming on stream at a time when market pulp demand growth may be slowing. One reason for this is increased integration of pulp and paper production, particularly in Europe. Another is more competition from deinked wastepaper pulp, mechanical pulp, and mineral fillers due to environmental and cost pressures. The result will be substantial overcapacity that could last well into the mid-1990s and hold back the recovery in pulp prices.

U.S. chemical paper-grade market pulp capacity is expected to jump 9.9% in 1992, while Canadian capacity increases 2.4%. Even though shipments are expected to rise about 5% next year, Canadian mills are only expected to run at about 84% of capacity next year, while U.S. mills will average about 90%. ■

SUPPLY/DEMAND *(000 tons)*



FORECAST *(000 metric tons)*

U.S.	**1990**	**1991e**	**1992e**
Production	6,820	7,020	7,410
Capacity[1]	7,145	7,492	8,236
Utilization rate	95.4%	93.7%	90.0%
Imports	2,552	2,420	2,460
Exports	4,335	4,800	5,060
Apparent U.S. consumption	5,037	4,640	4,810
Canada			
Production	6,235	6,450	6,770
Capacity[1]	7,460	7,893	8,086
Utilization rate	83.6%	81.7%	83.7%

e=Pulp & Paper 1991 estimate.

[1] Based on 1990 American Paper Institute and 1991 Canadian Pulp & Paper Assn. capacity surveys.

TOP U.S. PRODUCERS *(000 mtpy)*

	Annual capacity 000 metric tpy	**Market share (%)**
1. Weyerhaeuser[1,2,4,5]	1,540*	10.0
2. Georgia-Pacific[1,2,4,5]	1,530	9.9
3. Parsons & Whittemore[1,2]	1,110*	7.2
4. Canadian Pacific[1,2]	930	6.0
5. Stone[1,2]	745[a]	4.8
6. Champion[1,2]	710[b]	4.0
7. Fletcher Challenge[1]	665[c]	4.3
8. Canfor[1,3]	585[d]*	3.8
9. Federal[1,2]	540	3.5
10. MacMillan Bloedel[1,2,3]	500	3.2

Market share of top five companies:
38.0%

Market share of top ten companies:
57.5%

North American capacity (1991):
15.385 million metric tons

*Includes major new capacity addition (which may not be fully operational).

1. Bleached softwood kraft. 2. Bleached hardwood kraft 3. Unbleached kraft. 4. Bleached sulfite. 5. Fluff pulp.

a. Includes 25% of Celgar Pulp. b. Includes 84.6% of Weldwood, which owns 50% of Cariboo Pulp. c. Includes 45% stake in Donohue-St Felicien. d. Includes 50% of Howe Sound Pulp.

ISSUE FOCUS: TRANSPORTATION

Transportation Mismanagement Causes Paper Companies to Lose Millions

Expert says paper industry is wasting money by giving control of transportation decisions to its customers

By KELLY H. FERGUSON, Projects Editor

Customer service has become a key focus of North American pulp and paper companies during the last decade. Quality improvement programs and customer-supplier partnerships have been part of a new emphasis on serving the customer, whether it is a converter, publisher, or distributor.

But in transportation, paper companies are spending too much to meet their customers' needs. Evidence suggests that unnecessary costs have been incurred to achieve the service requested by the customer. Yet this sacrifice may not be necessary. Paper companies can achieve better service and improve transportation cost-effectiveness at the same time.

Most of this unnecessary cost results from fragmentation of control over transportation decision making and spending—both externally and internally. More customers are taking a role in directing transportation, i.e., specifying mode of transportation, picking up product, or having product delivered, thus taking much of the control away from the paper companies.

Within a paper company, it is not always clear who should influence and control transportation. The real challenge is determining who has the leverage (internally or externally) and who should manage the relationship with the carriers. Such a determination is necessary to achieve a high degree of customer service along with increased productivity.

Pulp & Paper recently discussed ways to curtail this excess spending, focusing on controlling transportation and distribution within and outside the mill, in an interview with John Anderson, vice president at A.T. Kearney. In a previous interview, Anderson talked about methods the transportation industry was using to serve the pulp and paper industry better (P&P, Nov. 1989, p. 87).

A.T. Kearney is a management consulting firm, and Anderson specializes in logistics and transportation. The company has worked for most major paper companies in North America as well as railroad and trucking firms that serve the paper industry.

This article is the second part of a series on reducing costs in the industry, written in cooperation with experts from A.T. Kearney. The first article (Sep. 1991, p. 110) focused on cost procurement considerations for power and utility operations at pulp and paper mills. A third article will discuss the cost savings in the purchasing functions.

P&P: *How much money is being spent by the pulp and paper industry on transportation, and how does that figure compare with other industries?*

Anderson: According to our estimates, the value of pulp, paper, and allied shipments exceeded $132 billion in 1990. The transportation portion represents approximately 7% of a paper company's gross sales, based on a recent study by A.T. Kearney (Table 1). The 7% figure is about the highest transportation cost as a percentage of gross sales of any industry—exceeded only by the mining and metals industry.

Based on that 7% figure, the paper industry is spending more than $9 billion annually on transportation. Moreover, this figure is somewhat understated because it does not account for those shipments picked up by the customer or where the customer arranges for and pays the freight. If such noncontrollable freight is considered, the transportation dollar amount is probably closer to $12 billion.

Transportation is by far the largest component of lo-

TABLE 1: **Transportation at a typical pulp and paper company makes up 7.1% of gross sales, based on a recent study. While the paper industry is generally in line with other industries on logistics costs, that 7.1% cost is probably the highest of any industry, except for the mining and metals industry.**

Function	Paper and related goods	Overall
Transportation	7.1%	3.9%
Warehousing	1.4%	1.8%
Inventory and carrying costs	1.6%	2.8%
Logistics and administration	0.9%	0.7%
Overall	11.0%	8.8%

gistics costs for the paper industry. For a $2.6-billion paper company we recently worked with, transportation represented 67% of total logistics costs, or about $180 million (Figure 1). When inventory, warehousing, and administration costs are added to transportation expenditures, the total logistics costs make up 14% of a typical paper company's operating costs, directly behind fiber costs (28%) and manufacturing costs (27%) (Figure 2). Logistics costs as a percent of value added—those controllable costs over and above raw materials—is even higher, representing around 30% of a paper company's value-added chain (Figure 3).

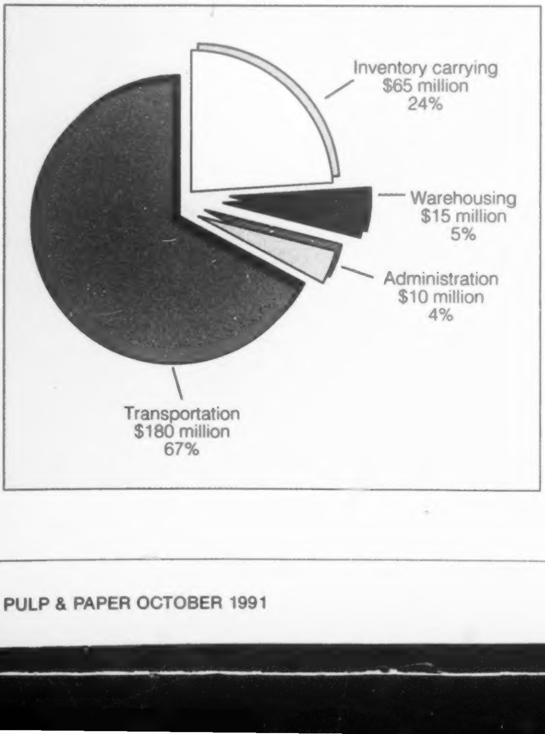
Therefore, improvement in logistics costs, especially transportation, can have a significant impact on a typical paper company's bottom line. It is also one of the most controllable value-added components in the supply chain.

P&P: *Why does the paper industry spend so much for freight shipments?*

Anderson: There are a number of reasons. Foremost is the stringent customer service requirements of the paper industry, especially in the white paper business. Paper company customers want to reduce inventory, eliminate warehouse requirements, shorten order lead times, and schedule production on a just-in-time basis. As a result, paper companies are being forced to ship the product faster and handle the product several times to meet customer requirements.

In many cases, the paper company is being forced to pay a transportation premium to meet promised delivery dates. Thus, more product currently is being handled by truck, which is generally at a higher cost than rail. Also, more product is being handled through distribution centers, which require shipping into and out of the centers.

FIGURE 1: **A.T. Kearney recently worked with a paper company whose logistics costs were about $270 million; $180 million of that figure was transportation costs. Such large expenditures show transportation and inventory are major leverage points for pulp and paper companies.**



John Anderson, vice president at A.T. Kearney, specializes in logistics and transportation.

In addition, paper companies are not leveraging and controlling their total transportation traffic and expenditures with their carriers and customers and are therefore paying a higher than required level of transportation costs. My experience suggests that paper companies, on average, are overspending by 10% to 12% for transportation.

P&P: *How much control has the industry given to its customers? And if regaining control is possible, can the industry satisfy customer requirements and be more cost-effective with transportation?*

Anderson: Customers have more control than most paper companies realize. However, it is not really a matter of how much control. The issue revolves around who should control the decisions—the customer or the shipper. The party that makes the decisions generally is the one that can achieve the most cost efficiency and leverage with the carriers.

Traditionally, the shipper has controlled the transportation of product, including selection of the mode of transportation and which carrier would be used. However, this is changing. More and more customers are seeking to control the purchase of transportation.

As for the question of whether the industry can achieve customer satisfaction and cost efficiency, the answer would have to be "yes." The essence of quality/customer service improvement is process improvement. Higher levels of customer service and cost efficiency go hand in hand. A paper company can achieve better service and improve transportation cost efficiency at the same time. The two are not inconsistent.

All too often, costs are being sacrificed unnecessarily to achieve the service requirements of the customer. This sacrifice is especially true in the pulp and paper industry, in which control over transportation decision making as well as spending is being given away to the customer or is fragmented within the paper company organization.

In effect, paper companies are giving up their responsibility for the final link of the logistics process—delivering the product to the customer. As a result, paper companies are overspending millions of dollars on the premise of keeping the customer happy.

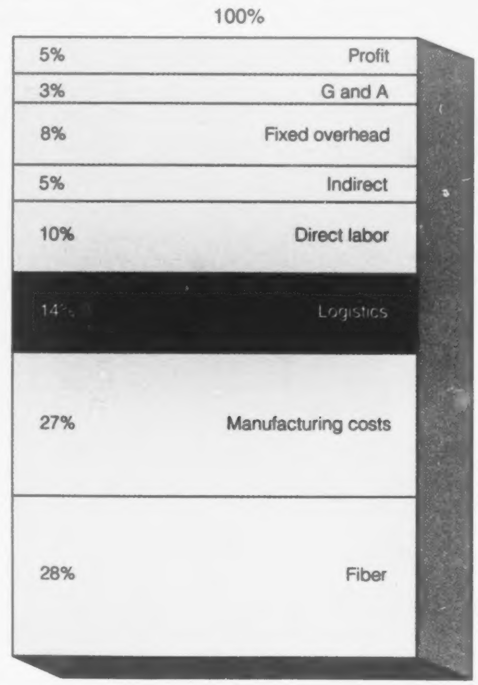
***P&P:** Earlier, you mentioned that paper companies, in an effort to shorten delivery times, have shifted more traffic from rail to truck, and thus possibly have incurred higher costs. Could you elaborate on this trend?*

Anderson: Clearly, more product (especially in the white paper segment) is being shifted to truck because of shortened order lead times and customers demanding just-in-time delivery. Customers don't want to hold inventory. They want to pick up the phone, place the order, and have a truck deliver product the next day.

Also, order sizes are getting smaller, necessitating truck delivery. As a result, truck shipments currently account for more than 55% of total pulp and paper shipments, whereas just a few years ago, rail was the predominant mode of transportation (Figure 4).

> *While rail has tried to regain its lost share of the market . . . , the trend appears to be toward more use of truck shipments. Once shipments go by truck, it is difficult for companies to shift back to rail.*

FIGURE 2: **At a typical pulp and paper company, total logistics costs—expenditures for transportation, inventory, warehousing, and administration—make up 14% of operating costs, behind only fiber costs and manufacturing costs.**



Source: A.T. Kearney/NCPDM productivity study

While rail has tried to regain its lost share of the market through price initiatives, the trend appears to be toward more use of truck shipments. Once those shipments go by truck, it is difficult for companies to shift back to rail.

However, truck transport is generally higher in cost than rail, so paper companies are often paying a premium to ship products by truck. Based on my experience, more traffic could be handled by rail at lower costs if greater effort were given to better production planning, order scheduling, and working with customers to establish reasonable lead times and consistent/reliable delivery.

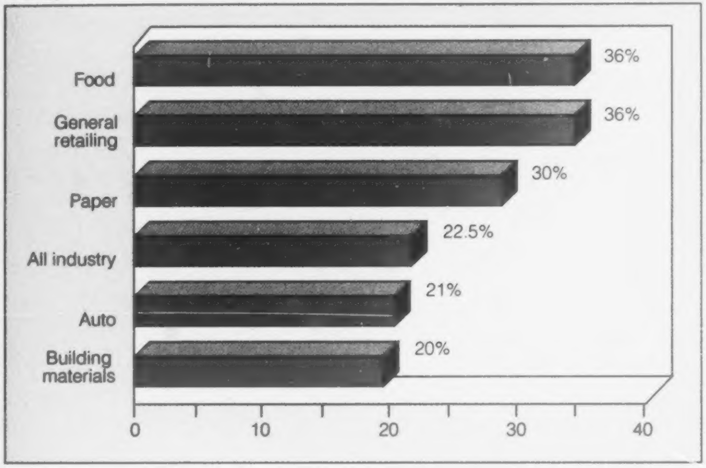
***P&P:** Is the industry well positioned to achieve such freight savings opportunities?*

Anderson: Unfortunately, no, because of fragmentation within paper company organizations as to who influences and controls transportation. Based on a recent survey by Kearney of pulp and paper companies, transportation decision making in the paper industry appears to be highly fragmented (see related article, p. 56). It is common to find at least three organizational units in many paper companies that make transportation decisions. These groups include sales/marketing, mill shipping, and central transportation/distribution.

A fairly large portion of the paper industry's central transportation/distribution groups serve in an advisory capacity and will influence transportation decisions but not make them. They measure transportation costs and performance but are not directly responsible for modal decisions.

As mentioned earlier, modal decisions (whether to ship by rail or truck) are generally dictated by the customer or decided by sales and marketing, with emergency decision authority given to mill personnel (in the event production scheduling problems threaten promised delivery dates). Carrier selection decisions are generally made by the central transportation/distribution groups when there is line authority and by the mills when the central transportation/distribution group has

FIGURE 3: **Logistics costs as a percent of value added, which includes those controllable costs over and above raw materials, represent approximately 30% of a paper company's value-added chain. Only the food industry and general retailing are higher.**



staff authority.

Additionally, we found that many paper companies are decentralizing their transportation function, giving more control and decision-making responsibility to the mills and to their customers. Unfortunately, most mill transportation personnel are primarily concerned with getting the product shipped on time and damage free. They don't see the overall picture with respect to the company's total transportation system and how it should be controlled and leveraged.

For example, most mill-level decision makers don't know how to bundle and leverage traffic across several mills with the carriers. Or how a selection of core carriers benefits the entire company. They cannot answer questions such as, "What modal choices are best?" "Which customers should be allowed to pick up freight?" and "When does it make sense for the customer to arrange for the transportation if it has more leverage with the carriers?"

P&P: *What steps should be taken by paper companies to gain control over transportation and to leverage the cost improvements across the industry?*

Anderson: As discussed earlier, the fragmentation of control over transportation decision making is both internal and external. Thus, paper companies need to take steps within their organization to gain better control and management over the transportation function as well as to work with customers more effectively in understanding their requirements to make sure those requirements are being met in the most cost-efficient manner.

The following are some of the steps that I would recommend, starting with the customer. Paper companies should establish customer service requirements jointly with their customers. Such requirements should include on-time delivery, final mode of delivery, cycle time, and other service aspects, such as order completeness, damage, and invoice accuracy.

Once the requirement is understood and agreed on, then the party that is best positioned to work with the carriers as a partner should manage the process. This is usually the shipper. Then the shipper (or whoever is in the best position to work with the carrier) teams up with the appropriate carriers to work together on such areas as the following:

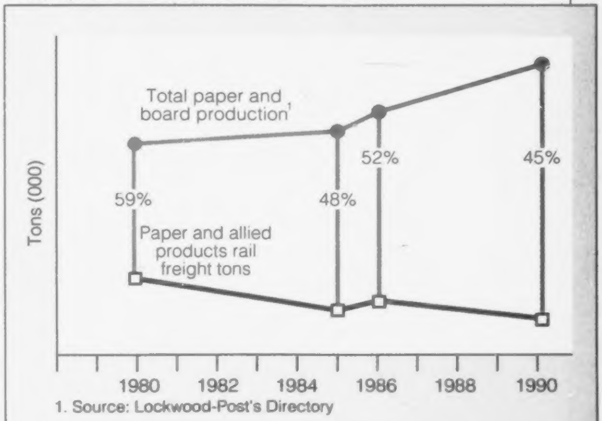
- Process improvements
- Productivity gains
- Rate for volume deals
- Service guarantees
- Value-added services, e.g., online or satellite tracking of shipments.

In addition, the company needs to establish pickup allowance policy. Paper companies should not let mills/marketing do it unilaterally. A paper company should take the following steps:

1. Identify and assign a senior management person (vice president level) to drive the process and to cut across division lines. Marketing and manufacturing should be involved in the process.

2. Centralize the transportation/logistics function at a corporate level under one department (if not centralized already) or develop a corporate transportation management council to oversee management of the function. If a transportation council is established, it should be

FIGURE 4: **While the rail industry has tried to regain some of its market share, especially in 1985 and 1986, it has increasingly lost pulp and paper business. Trucking companies now carry about 55% of total paper and board production, even though costs for shipping by truck are typically higher than rail.**



1. Source: Lockwood-Post's Directory

Enlightened senior management is beginning to awaken to the importance of transportation . . . They view logistics and transportation as critical to improve service and reduce costs.

chaired by a senior vice president.

The role of the central transportation department or council should be to plan the best process for managing transportation, select modes and carriers, negotiate rates and contracts with carriers, and monitor carrier performance and mill decision making.

3. Provide focus resources, including outside help if needed, to make a thorough evaluation of the company's transportation function, including the following:

- Analysis of where freight dollars are spent—by mode and carrier, by mill, and by product group
- Analysis of noncontrollable freight costs, i.e., customer pickup or where customer arranges and pays the freight
- Analysis of current rate levels vs those of competitors, and fair rate levels based on carrier's cost of service
- Assessment of competitive transportation options and identification of potential for capitalizing on corporate purchase volumes
- Assessment of modal choices and most cost-efficient method of transportation to meet customer service needs for each major traffic lane.

4. Conduct negotiations with carriers and establish contracts with core group of carriers. The scope of this responsibility includes the following:

- Developing negotiation strategies
- Establishing a negotiation team with senior management participation
- Developing a formalized bid program to go to carriers, both rail and truck, with traffic lane data and volumes provided; specific service requirements should be included also
- Leveraging competitive situations and total traffic volume across the company
- Establishing target rate levels based on carrier's costs and competitive situations.
- Awarding traffic and selecting carriers on basis of fact, including service performance, rates, equipment availability, damage, safety, service area coverage
- Working with customers in leveraging traffic and who should manage the relationship with the carriers.

5. Put in a system to monitor carrier performance, measure results, and receive ongoing feedback.

If a company follows the above steps, I feel confident that it will achieve greater cost efficiency without sacrificing customer service requirements.

P&P: *Why hasn't more focus been placed on this issue by senior management?*

Anderson: First, in most instances, they don't have full appreciation of the magnitude of the problem and that it is growing. Historically, senior management at paper companies have come up through the manufacturing and marketing side of the business. They have come to view transportation with less importance than manufacturing and marketing and consider it a given.

To many, transportation remains a shipping function. They are not concerned about who controls the freight and whether the function is centralized or decentralized. For the most part, they leave it up to the transportation managers in the company to manage the activity.

Most transportation managers, however, are more concerned about getting the product to the customer on time and damage free than they are with cost efficiency and who controls the freight. Also, most lack the responsibility and control to do much about it. Therefore, when a customer wants to pick up or control the freight, who is the transportation manager to say he can't. To him, it is primarily a marketing issue.

Moreover, the transportation manager probably lacks the resources to perform the kind of analysis needed to leverage the total transportation dollars across the company and make the optimum trade-offs of modal choices and who is in the best position to leverage freight, the shipper or the customer.

Enlightened senior management is beginning to awaken to the importance of transportation in the supply chain process. They view logistics and transportation as a critical component to improve service and reduce costs.

P&P: *Based on your experience in working with a number of different industries, how does the pulp and paper industry compare relative to the management and control of the transportation function?*

Anderson: Based on research conducted by Kearney during the last ten years, we have found that companies, and functions within companies, evolve through a series of Stages (I through IV). We have identified the various characteristics of "Stages of Excellence" found in transportation within each stage (Tables 2A and 2B).

It has been our experience that most pulp and paper companies exhibit Stage I characteristics in transportation, whereas industries in general are more likely to exhibit Stage II characteristics.

Ironically, paper companies exhibit a higher level of customer service than do most other industries. Our research indicates that paper companies are ahead in such areas as on-time delivery performance, order completeness, order fill rate, invoice accuracy, and damage-free receipt.

This further suggests that paper companies may be paying too much to meet customer service requirements. Again, I believe improved service and cost efficiency can go hand in hand.

***P&P:** What advise do you have for pulp and paper companies for assessing this problem within their company?*

Anderson: Senior management must begin by asking a number of fundamental questions of their organization:

- What do we really spend on outbound and inbound freight?
- What percentage of our shipments is noncontrollable, i.e., the customer picks up or arranges for the freight, and what are the dollar amounts being spent?
- Who decides the freight terms?
- How do we measure service reliability?
- Do we have a customer pickup policy? Who determines which customers can pick up and which ones cannot?
- What percentage of our business is handled as emergency shipments?
- Is senior management involved in negotiation of freight rates?
- Do we know how much we are paying in premium freight beyond what the rate carrier is?
- Do we know what our on-time service performance is, by carrier and by customer?
- Are we leveraging transportation across the entire company and with customers?

Answers to these questions will provide a barometer of how well the transportation function is being managed and whether costs are being sacrificed unnecessarily to achieve the service requested by the customer. ■

TABLES 2A and 2B: **A.T. Kearney has developed a method to analyze how a company evolves in its management of transportation. Called "stages of excellence," the method reveals that paper companies are only at Stage I, whereas other industries in general show Stage II characteristics.**

Level	Management focus	Characteristics	Reasons for action	Type of action
Stage I	Transaction processing	• Time period is today • Low productivity—people not doing the right things • No budgets • No information on transportation costs	• Daily operations • Crisis reaction	• Quick fix
Stage II	Cost control	• Time period is today and tomorrow • Reactive not proactive • Budgets covering most transportation expenditures • Basic operating information/no effective management information	• Budget pressure • Management directive	• Cost reduction
Stage III	Functional excellence	• Time period is year • Planning activities • Available management information • Monitor progress toward plans • Identify "best" transportation solution for short term	• Target improvement • Sales/demand shifts • Short-term plan	• Productivity improvement
Stage IV	Strategic integration	• Time period is long term (1 to 5 years) • Integrated management decisions (e.g., marketing, purchasing, transportation) • Sophisticated planning process in place • Very proactive	• Competitive positioning	• Long-term strategy

Level	Prerequisites for change	Transition requirements	Major improvements
Stage I	• Some reassignment of transportation responsibilities • Formal budgeting/planning process • Formal cost-reduction program	• Data availability • Management must understand — Size of expenditures — Opportunity for savings	Consolidate carrier base and conduct trade negotiation
Stage II	• Ongoing improvement program • Performance targets and measures • More proactive programs	• Comparative "benchmark" data • Management must be convinced — Transportation is important — Additional opportunity	Employ asset management programs for transportation
Stage III	• Integrated operations plan • Superior analytical capabilities • Broader responsibilities	• Clear linkage to business marketing, manufacturing strategies • Management must be committed	Design new distribution programs
Stage IV	• Dynamic business environment • Accept the challenge • Integrated business plans	• Ongoing management commitment to transportation	Employ customer profitability analysis to support decision making

Wastepaper, Woodchip, Pulp Exports Continue to Boom Despite Downturn

North American seaport survey shows a general leveling off in pulp, paper, and allied exports, but expectations are still high for wastepaper growth

By KELLY H. FERGUSON, Projects Editor

Massive tonnages of pulp, paper, and forest products continue to move through North American seaports, even though the current industry downturn has caused a slight leveling off in the growth the ports have experienced in the past two to three years, according to a *Pulp & Paper* survey of North American ports. But foreign demand for market pulp, wastepaper, and woodchips, coupled with normal trade between the U.S. and Canada, has meant that paper and allied exports from North America continue to be almost six to seven times the tonnage of imports.

The *Pulp & Paper* survey was sent to all North American ports listed in the American Assn. of Port Authorities' "Seaports of the Western Hemisphere" directory. The survey was completed by 37 ports from all leading shipping areas of the U.S. and Canada, including some of the largest pulp and paper ports. A similar survey was conducted in 1990 (*P&P*, November 1990, p. 65). While some comparison of results from the two surveys is possible, differences in methods used by ports to report data make a complete comparison impossible.

Tables 1 and 2 break down survey results by exports and imports of major products. Based on responses, the largest export was woodchips (6.34 million tons), followed by wastepaper (4.20 million tons) and market pulp (4.09 million tons). As in last year's survey, the Northwest ports—Coos Bay and Portland, Ore., and Tacoma, Wash.—exported the most woodchips, logs, and lumber. However, the Alabama State Docks (Port of Mobile) made a significant leap in woodchip exports, going from 250,000 tons in the 1990 survey to 837,050 tons in this year's survey.

On the import side, newsprint was the leader (1.11 million tons), followed by logs and lumber (included in the "Other" category) and paper/paperboard. The largest newsprint tonnages came into the ports of Long Beach, Calif., Tacoma, Wash., Canaveral, Fla., and Houston, Texas, and the majority of total newsprint tonnage was likely brought down from Canada or shipped from other U.S. ports. Most of the imported market pulp came into the northern ports (probably shipped from Canada), but major shipments were also received by the ports of Mobile, Ala., and Savannah, Ga.

WASTEPAPER GROWS, PAPER PRODUCTS PLATEAU. Almost all responding ports that handle wastepaper indicated an increase in tonnage over the previous year, and most expect those increases to continue (see sidebar). The largest exporters of wastepaper, according to the 1991 survey, were the ports of New York-New Jersey (1.42 million tons) and Long Beach (923,218 tons), Worldport L.A., (683,540 tons), and Oakland (610,344 tons) in California.

Interestingly, the Port of Miami, Fla., indicated no wastepaper handling in 1990, but showed a tonnage of 85,000 in the 1991 survey. This increase is probably indicative of the rapid increase in companies wanting to take advantage of the booming wastepaper export market. That market, though, has slowed dramatically. According to a report in the June 1991 issue of *Paper Recycler*, lower market pulp prices and a decreased consumer demand for paper and paperboard products in foreign nations have slowed the need for the high-quality U.S. wastepaper that was in such demand during the past several years. However, foreign demand is expected to pick up by the end of 1991.

Market pulp export tonnages, as expected, seem to echo the general industry downturn. Most of the major market pulp ports that responded to both surveys said that tonnages had dropped. The Port of Mobile showed a decrease from 900,000 tons in 1990 to 743,948 tons in 1991. The Georgia Ports Authority (Savannah and Brunswick) reported a decrease from 539,668 tons in 1990 to 481,677 tons in 1991. Other major market pulp ports showing decreases were Baton Rouge, La., New Orleans, La., Charleston, Va., and Tacoma, Wash. Some ports showed increases, however, including the ports of Pascagoula, Miss., (156,431 tons in 1990 to 227,936 tons in 1991) and North Carolina (440,000 tons in 1990 to 552,509 tons in 1991). Several ports reported that their handling of market pulp had increased significantly:

- *Port of Pascagoula*: 31% increase in five years, up 70,804 tons since 1986

- *North Carolina Ports Authority (Morehead City and Wilmington)*: 303,862 tons in 1986 to 552,509 in 1991
- *Port of Houston*: No tonnage in 1985 to 15,190 tons in 1989
- *Port of Portland*: 67,237 tons in 1986 to 79,121 tons in 1990
- *Squamish Terminals, B.C.*: 40% tonnage increase from 1985 to 1990.

PURSUING PAPER BUSINESS. Almost all the responding ports said they had special facilities for handling and storing of pulp, paper, and forest products. Several also said they were planning to construct new facilities or modernize existing facilities to increase tonnage capacity of forest products shipments. Wastepaper storage areas were one of the expansion projects mentioned most.

The ports were also asked if they were actively pursuing, or planned to pursue, business from pulp, paper, and allied companies. Almost all respondents said they were marketing to the forest products industry, and some of the specific port activities are listed as follows:

- *Port of Baltimore.* "The Port of Baltimore is emerging as a leading woodpulp and forest products center. The Maryland Port Administration and private companies in the port are actively pursuing pulp and paper business. The port has a solid foundation of pulp and forest products business. Port officials are working to solicit new business and to increase the tonnages from existing customers."
- *Port of Albany (N.Y.).* "Continued marketing and contact with brokers and users of market pulp, showing Albany's unique geographic location."
- *Port of New York-New Jersey.* "We have recently upgraded our facilities, and, through joint sales calls and advertising, are seeking additional pulp and paper cus-

TABLE 1: **Export tonnages of pulp and paper products from North American seaports.**

Exports

Port	Newsprint	Paper/ paperboard	Kraft paper	Market pulp	Wastepaper	Woodchips	Other
North/Midwest							
Baltimore, Md.	—	21,124	9,585	4,007	50,353	—	307,232
Delaware River, N.J.	—	119,162	—	67,997	29,141	—	—
Albany, N.Y.	—	—	—	—	—	—	—
New York-New Jersey	11,594	105,213	30,041	20,146	1,429,612	—	—
South							
Mobile, Ala.	10,827	12,998	289,459	743,948	—	837,050	—
Canaveral, Fla.	—	—	—	—	—	—	—
Miami, Fla.	—	22,000	—	—	85,000	—	—
Port Everglades, Fla.	3,000	3,000	—	—	40,000	—	—
Tampa, Fla.	—	—	22,918	—	11,361	—	—
Brunswick, Ga.	—	11,515[1]	—	428,418	—	—	—
Savannah, Ga.	—	303,003[1]	—	55,259	—	—	—
Baton Rouge, La.	—	58,375	—	260,444	—	—	—
Lake Charles, La.	11,471	83,325	—	—	—	169,824	—
New Orleans, La.	10,175	285,710[2]	—	136,831	—	6,807	—
Gulfport, Miss.	—	106,040	—	—	—	—	—
Pascagoula, Miss.	—	28,392	—	227,936	—	—	—
North Carolina	—	4,576	12,929	552,509	—	436,425	15,579
Charleston, S.C.	—	721,728[3]	—	359,872	—	—	209,852[4]
Beaumont, Texas	—	5,148	—	3,542	—	42,988	—
Corpus Christi, Texas	4,032	—	—	—	—	—	—
Galveston, Texas	—	7,456	4,201	—	245	85	—
Houston, Texas	5,850	8,287	98,772	11,077	24,809	—	47,828
Port Arthur, Texas	—	2,245	18,855	13,251	—	—	—
Richmond, Va.	—	—	—	—	4,192	—	—
West							
Long Beach, Calif.	52,053	—	—	25,210	923,218	—	—
Oakland, Calif.	16,739	14,786	9,207	18,019	610,344	1,030	—
Worldport L.A., Calif.	49,838	—	—	—	683,540	—	27,212
Honolulu, Hawaii	—	—	—	—	50,728	—	—
Coos Bay, Ore.	—	18,727[5]	—	—	—	2,988,391	—
Portland, Ore.	—	216,645[6]	—	79,121	77,699	683,311	579
Grays Harbor, Wash.	21,000	—	—	7,200	1,500	—	—
Port Longview, Wash.	—	—	—	17,802	—	—	—
Tacoma, Wash.	114,776	67,433	136,531	122,867	184,318	1,179,275	2,910,741[4]
Canada							
Port Alberni, B.C.	378,036	—	—	85,737	—	—	—
Squamish, B.C.	19,841	—	2,204	760,587	—	—	—
Chicoutimi; Que.	—	—	—	89,000	—	—	—
Quebec, Que.	156,094	8,582	—	1,222	—	—	—

1. Includes newsprint, kraft paper, and wastepaper.
2. Includes kraft paper and wastepaper.
3. Includes all paper and board grades and wastepaper.
4. Tonnages are for logs and lumber.

tomers based on a commitment to superior customer service and competitive prices."

- *Port Everglades Authority.* "The marketing and sales department contacts paper import and export customers and the companies that handle these commodities at Port Everglades."
- *Tampa Port Authority.* "Aggressively marketing our facilities and services to suppliers in our area, as well as to buyers in Latin America."
- *Georgia Ports Authority.* "The pulp and paper business has been of particular importance to the Georgia Ports Authority for many years. Specific attention will be given in the future to emphasize its use to draw ocean carrier service."
- *Port of Lake Charles.* "Direct sales calls, direct mail campaigns, and special wharfage rates."
- *Port of Pascagoula.* "Direct contacts with more companies. Securing additional ocean carriers and expanded trade routes. Continuing to increase our enclosed cargo facilities."
- *North Carolina Ports Authority.* "An ongoing program is in place to maintain current volume and add to tonnages in response to ever-increasing market pressure; also to ensure shippers/carriers of sufficient storage space availability and constantly updating handling-equipment capability. Also, we maintain a constant dialogue with inland modes to improve rate structure in relation to competing ports from mill to port."
- *Port of Beaumont.* "By stressing the following points: ideal port location with about 50 forest products mills within a 100-mile radius; excellent and economical highway and rail connections to forest products mills; efficient layout for handling diverse types of forest product cargoes; and expedited switching from rail cars to wharves, with around-the-clock direct services by four major rail carriers." ■

TABLE 2: **Import tonnages of pulp and paper products from North American seaports.**

Imports

Port	Newsprint	Paper/ paperboard	Kraft paper	Market pulp	Wastepaper	Woodchips	Other
North/Midwest							
Baltimore, Md.	—	21,124	9,585	4,007	50,353	—	307,232
Delaware River, N.J.	—	513,549	—	138,190	59,224	—	—
Albany, N.Y.	—	—	—	25,000	—	—	—
New York-New Jersey	72,768	153,024	4,768	80,438	—	—	—
South							
Mobile, Ala.	—	—	—	104,326	—	—	—
Canaveral, Fla.	145,000	—	—	—	—	—	—
Miami, Fla.	55,000	5,000	—	—	—	—	—
Port Everglades, Fla.	72,700	4,000	—	—	5,000	—	—
Tampa, Fla.	9,969	—	—	—	—	—	—
Brunswick, Ga.	—	—	—	—	—	—	—
Savannah, Ga.	—	15,345[1]	—	103,040	—	—	—
Baton Rouge, La.	—	—	—	—	—	—	—
Lake Charles, La.	—	—	—	—	—	—	—
New Orleans, La.	301	8,674[2]	—	—	—	9,996	—
Gulfport, Miss.	—	—	—	8,421	—	—	—
Pascagoula, Miss.	3,598	—	—	—	—	—	—
North Carolina	—	1,021	—	1,572	—	—	424
Charleston, S.C.	—	131,010[3]	—	1,154	—	—	88,171[4]
Beaumont, Texas	—	—	—	—	—	—	—
Corpus Christi, Texas	—	—	—	—	—	—	—
Galveston, Texas	332	6,092	—	—	106	—	—
Houston, Texas	120,676	86,000	160	—	—	—	36,700
Port Arthur, Texas	3,479	—	—	—	—	—	—
Richmond, Va.	15,552	—	—	—	—	—	—
West							
Long Beach, Calif.	373,686	—	—	—	—	—	—
Oakland, Calif.	7,203	44,000	219	83	—	—	—
Worldport L.A., Calif.	21,115	—	—	—	237	—	38,408[4]
Honolulu, Hawaii	40,742	31,872	—	—	—	—	—
Coos Bay, Ore.	—	—	—	—	—	—	—
Portland, Ore.	—	613	—	—	—	—	—
Grays Harbor, Wash.	—	—	—	—	—	—	—
Port Longview, Wash.	—	—	—	—	—	—	—
Tacoma, Wash.	173,134	9,311	3,086	—	8,778	8.736	—
Canada							
Port Alberni, B.C.	—	—	—	—	—	—	—
Squamish, B.C.	—	—	—	—	—	—	—
Chicoutimi, Que.	—	—	—	—	—	—	—
Quebec, Que.	2,173	267	—	—	—	—	562,681[4]

1. Includes newsprint, kraft paper, and wastepaper.
2. Includes kraft paper and wastepaper.
3. Includes all paper and board grades and wastepaper.
4. Tonnages are for logs and lumber.

The growing wastepaper export market

The boom in recycled fiber use, in North America and throughout the world, has had an enormous impact on the amount of wastepaper being shipped through seaports. The recovery rate for all grades of wastepaper has just begun to pick up in the U.S. and Canada; thus large amounts of high-quality recyclable fiber have gone untouched by North American paper companies until recently. Nations in the Pacific Rim, Europe, and Latin America have taken advantage of this situation, importing increased amounts of fiber and creating a booming business in wastepaper exporting.

But with more North American pulp and paper companies utilizing recycled fiber in their own processes, the total amount of wastepaper available for export will shrink. Almost all the surveyed ports that handle wastepaper indicated that their wastepaper exports had increased during the last five years. The survey also asked if the ports were expecting wastepaper shipments to grow in the next five years. Some of the predictions follow:

Port	**Growth predictions**
Delaware River	Discussions with paper-handling firms indicate exports of wastepaper will rise significantly in the next five years. Estimated growth rate could be 25% to 35%.
Long Beach	Expected growth will be 5% to 10% in the next five years.
Port Everglades	Wastepaper exports should grow about 5% to 10% per year.
Tampa	Exports should grow approximately 10% to 15% in the next five years.
New York-New Jersey	Due to the new laws requiring a greater percentage of recycled fibers to be included in newsprint within the states of New York and New Jersey, we expect that rail shipments of wastepaper to Canadian newsprint mills will increase, absorbing the growing volume of wastepaper. The unavailability of ocean containers for shipping wastepaper, a low value commodity, also limits volume of exports.
North Carolina	We definitely expect exports of wastepaper to grow during the next five years, especially in the break-bulk sector. Currently, there are no significant tonnages exported from Wilmington or Morehead City. What is moving currently is in containers when available, and they are very scarce at the moment. Percentage increase could be in triple figures.
Worldport L.A.	Export growth will depend on the growth of Chinese (mainland) trade.

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